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Industrialization of Finance

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Journal

Industrialization of Finance

Part 1

Part 2

Dear Reader,

Welcome to the latest edition of our Journal. Why “the industrialization of finance”?

Because post-crisis, as we re-build an industry that is ready for the opportunities of the future, we need to focus on the strategies and implementation that will help us all work more reponsively, more efficiently, and in ways that shape the future of financial services positively and sustainably.

By “industrializing” what we do, we are not advocating a mechanical or unimaginative approach – quite the opposite. What we are saying is that techniques and tools exist to make the commoditized and process aspects of the industry as reliable, predictable and efficient as possible, while focusing on what will differentiate customer service and product innovation.

At Capco, we have no doubt of the will and the creativity that already exist within global financial services. These qualities are ready to be applied to the tasks of meeting stakeholder expectations and rising to the challenges of transformational change. Yes, the lessons of recent history are still poignant. But intense competition, reduced margins and the need to identify and exploit new markets are evident in every industry. The automotive, retail, pharmaceutical, and in truth every industrial and commercial sector can tell a similar story of enormous change. The greatest difference perhaps is that our sector sits at the heart of national, regional and global economic recovery and prosperity. The expectations and the pressures are therefore even greater. And our responses have to be all the more robust.

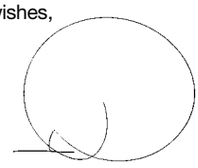
Of course, we need to temper optimism with realism: blind faith is not a sound basis for the years ahead. But we also need to bear in mind that by its very nature, history happens in the rearview mirror. Our task now is to look forward. Ahead lie some serious responsibilities, not least to comply with a rapidly evolving regulatory framework, while rising to the expectations of a far broader range of stakeholders (who now include in many cases national governments and their electorates, as well as traditional shareholders).

So the future will be different. And that means our responses, not least in terms of operational efficiencies and improved technology platforms, will need to be positively different as well. Yet this is absolutely not beyond the scope of our collective imagination, expertise and talent. By tackling complexity and exploiting the amazing march of connectivity, we can do traditional things in new and better ways, and we can offer our stakeholders more of what they want and need.

As this latest edition of the Journal illustrates, some keen intellects are focused on the challenges that face us. As we “industrialize” we also have an opportunity to build a financial services sector that is the polar opposite of the negative assertions we have all heard since the most recent crisis. I hope you enjoy the views and insights of our Journal contributors. Incidentally, this edition reflects our faith in the renaissance of the industry by carrying the look and feel of our new branding – which I hope will meet with your approval.

As ever, we look forward to your feedback and to playing our part at Capco in forming the future of finance.

With warm good wishes,



Rob Heyvaert,
Founder and CEO, Capco

Finance is Coming of Age

The world of finance has undergone a renaissance in recent years. Many of the long held beliefs about the subject have been shattered. Pricing models that used to be viewed as the cornerstone of finance have come under tremendous scrutiny by those who do not have a vested interest in protecting their lifetime of research. While many academics are clinging onto the notion of efficient markets, the real world has moved on and is looking for more reliable ways in which assets can be priced. Risk measurement and management models that were viewed as airtight even as recently as a couple of years ago have been proven to be anything but.

The implication of the failure of academic, and to a large extent applied, finance has been that many have started to look for new ways in which stakeholders can be protected and even develop new ways in which financial institutions should model risk and asset pricing. This is essential if we are to avoid the same kind of hubris-based crises in the future. But, of course, finance is more than just reliable asset and risk pricing. Our industry is beginning to understand that it too needs to learn how an industry and its constituent companies should best be managed.

It is at the point at which previous failures are objectively questioned and new models developed that an industry comes of age, and finance is certainly doing that. It is at last joining its peers in other industries in learning to ask the tough questions and ignore the attacks of those members of the academia who have a vested interest in maintaining the status quo. We are at a similar point that physics was when gravity was identified, or when it was proven that the world is round. The entire premise of the subject has changed and significantly more innovative, and more importantly practical models, will certainly be developed. They are necessary since like all other industries that came before us we are learning to operate in a complex world in which competition will result in the erosion of margins, where reliable pricing is key, and where innovation is essential for success.

It is due to the fact that we are witnessing the industrialization of finance that we have dedicated this edition of the Journal to this subject. The papers in this issue examine the impact of the anticipated changes in the regulatory, technological, and competitive environment on the financial services industry and try and provide prescriptive solutions to how they can be most effectively met. The topics covered range from looking at how old instruments and markets are changing, to the implications of helping the future generation of bankers in developing economies. In reality, this is the first edition of a long series of issues dedicated to the topic of industrialization of finance.

We hope that you enjoy the articles in this edition of the Journal and that you continue to support us by submitting your ideas to us.

On behalf of the board of editors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Part 1

A Critique of Alan Greenspan's Retrospective on the Crisis

Share Price Disparity in Chinese Stock Markets

How Might Cell Phone Money Change the Financial System?

Technology Simplification and the Industrialization of Investment Banking

Compliance Function in Banks, Investment and Insurance Companies after MiFID

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Securitization of Financial Asset/Liability Products with Longevity Risk

PART 1

A Critique of Alan Greenspan's Retrospective on the Crisis

Jerome L. Stein — Division of Applied Mathematics, Brown University

Abstract

Alan Greenspan's paper (March 2010) presents his retrospective view of the crisis. His theme has several parts. First, the housing price bubble, its subsequent collapse, and the financial crisis were not predicted either by the market, the Fed, the IMF, or the regulators in the years leading to the current crisis. Second, financial intermediation tried to function on too thin layer of capital – high leverage – owing to a misreading of the degree of risk embodied in ever more complex financial products and markets. Third, the breakdown was unpredictable and inevitable, given the "excessive" leverage – or low capital – of the financial intermediaries. Greenspan now focuses on desirable capital requirements for banks and financial intermediaries. Too high a capital requirement will not provide a sufficiently high rate of return on financial assets to attract capital. Too low a capital requirement unduly raises risk and endangers bank solvency. The Fed, IMF, the Treasury, and the market lacked the appropriate tools of analysis to answer the following questions: what is an optimal leverage or capital requirement that balances the expected growth against risk? What are theoretically founded early warning signals of a crisis? I explain why the application of stochastic optimal control (SOC)/dynamic risk management is an effective approach to determine the optimal degree of leverage, the optimum and excessive risk, and the probability of a debt crisis. The theoretically derived early warning signal of a crisis is the excess debt ratio, equal to the difference between the actual and optimal ratio. The excess debt starting from 2004-05 indicated that a crisis was most likely. This SOC analysis should be used by those charged with surveillance of financial markets.

Greenspan's theme

Prior to the subprime crisis of 2007, there was a false sense of safety in financial markets. Alan Greenspan (2004a) said that "…the surge in mortgage refinancings likely improved rather than worsened the financial condition of the average homeowner." Moreover "[o]verall, the household sector seems to be in good shape, and much of the apparent increase in the household sector's debt ratios in the past decade reflects factors that do not suggest increasing household financial stress."

The market and the Fed did not consider these mortgages to be very risky. In February 2004, a few months before the Fed formally ended a run of interest rate cuts, Greenspan (2004b) said that "…improvements in lending practices driven by information technology have enabled lenders to reach out to households with previously unrecognized borrowing capacity. This extension of lending has increased overall household debt but has probably not meaningfully increased the number of households with already overextended debt." By 2007, a measure of risk, the yield spread (CCC bonds – 10 year U.S. Treasury) fell to a record low. Ben Bernanke (2005) said in his testimony before Congress's Joint Economic Committee that U.S. house prices had risen by nearly 25 percent over the past two years. However, these increases "largely reflect strong economic fundamentals" such as strong growth in jobs, incomes and the number of new households. The failure to realize that there was an unsustainable bubble that would damage the world economy was pervasive. As late as April 2007, the IMF noted that "…global economic risks declined since … September 2006 … The overall U.S. economy is holding up well … [and] the signs elsewhere are very encouraging." The venerated credit rating agencies bestowed credit ratings that implied Aaa smooth sailing for many a highly toxic derivative product.

In 2008 Greenspan said, "Those of us who have looked to the self-interest of lending institutions to protect stockholders' equity, myself included, are in a state of disbelief." In his retrospective he asks: could the breakdown have been prevented? The Fed was lulled into complacency about a bursting of the bubble and its aftermath because of recent history. First, they anticipated that the decline in home prices would be gradual. Second, there were only modestly negative effects of the 1987 stock market crash. The injections of Fed liquidity apparently helped to stabilize the economy.

Greenspan's paper (2010) presents his retrospective view of the crisis. His theme has several parts. First, the decline and convergence of world real long term interest rates – not Federal Reserve monetary policy – led to significant housing price appreciation, a housing price bubble. This bubble was leveraged by debt. There was a heavy securitization of subprime mortgages. In the years leading to the current crisis, financial intermediation tried to function on too thin layer of capital – high leverage – owing to a misreading of the degree of risk embodied in ever more complex financial products and markets. Second, when the bubble unraveled, the leveraging set off a series of defaults. Third, the breakdown of the bubble was unpredictable and inevitable, given the "excessive" leverage – or unduly low capital – of the financial intermediaries. Fourth, the lesson for the future is that it is imperative that there be an increase in regulatory capital and liquidity requirements by banks.

The theme of my paper has several interrelated parts. First, the failure to anticipate the bubble, its collapse, and effect upon the economy stemmed from the absence of a theoretical model, with explanatory power, that measures what is an "excessive" debt or leverage or unduly low capital requirement that will raise the probability of a crisis. Such a model must take into account that the future movements of key variables are stochastic, and that the optimal leverage optimally balances expected return against risk. Second, Greenspan's (2010) suggestion of a minimum capital requirement is indeed a move in the correct direction, but could benefit from theoretical foundations. Third and foremost, the appropriate technique for the analysis is stochastic optimal control (SOC). On the basis of the SOC analysis, I derive a theoretically founded "early warning signal" (EWS). This EWS is the "excessive" debt, equal to the difference between the actual and optimal debt ratio, which would have predicted the crisis. Moreover, the optimal debt ratio implies the optimal capital requirement that Greenspan is seeking. Greenspan and Bernanke would have benefitted had their staff had the analytic tool developed here. It is hoped that the Fed will not be like the ancien régime: "Ils n'ont rien appris, ni rien oublié."

The Jackson Hole Consensus

Otmar Issing (2010) discussed the lessons to be learned by central banks from the recent financial crisis. The main thrust of his argument was a criticism of the Jackson Hole Consensus [JHC (2005)] for the relation between asset price bubbles and the conduct of monetary policy.

During the boom years, abundant liquidity and low interest rates led to a situation of excessive risk taking and asset price bubbles. The JHC has been the prevailing regulatory approach taken by the Fed. It is based upon three principles. Central banks: (1) should not target asset prices, (2) should not try to prick an asset price bubble, (3) should follow a "mopping up" strategy after the bubble bursts by injecting enough liquidity to avoid serious effects upon the real economy. A justification for this policy was seen in the period 2000-02 with the collapse of the dot.com bubble. The "mopping up" seemed to work well and there were no serious effects upon the real economy from following the JHC. Issing objects to the JHC because it constitutes an asymmetric approach. When asset prices rise without inflationary effects measured by the CPI, this is deemed irrelevant for monetary policy. But when the bubble bursts, central banks must come to the rescue. This, he argues, produces a moral hazard. He notes that although the JHC strategy worked well in the 2000-02 period it should not have justified the assumption that it would work afterwards

in other cases. The JHC strategy certainly did not work in the 2007-08 crisis that was precipitated by the bursting of the housing price bubble. He wrote: "Did we really need a crisis that brought the world to the brink of a financial meltdown to learn that the philosophy which was at the time seen as state of the art was in fact dangerously flawed? ...We must conduct a thorough discussion as to appropriate strategy of central banks with respect to asset prices."

Issing favors giving the central banks a mandate for macro-prudential supervision, the proposal by the Larosière group. The ECB should be responsible for identifying macroeconomic imbalances and for issuing warnings and recommendations addressed to national policymakers. The "solution" proposed is one that monitors closely monetary and credit developments as the potential driving forces for consumer price inflation in the medium to short run. "As long as money and credit remain broadly controlled, the scope for financing unsustainable runs in asset prices should also remain limited." He notes: "numerous empirical studies have shown that almost all asset price bubbles have been accompanied, if not preceded by strong growth of credit and or money." However, these studies, such as reported by the BIS [Borrio and Lowe (2002)], are vague and inconclusive. Even their authors conclude that the existing literature provides little insight into the key question that is of concern to central banks and supervisory authorities: when should credit growth be judged "too fast"? Moreover, contrary to Issing, it is very difficult to find a relation between recent money growth and the 2007-08 financial crisis. The BIS makes suggestions for further research. (1) Such work should pay greater attention to conceptual paradigms and be more closely tailored to the needs of policymakers: length of horizons in identifying cumulative processes, the use of ex-ante information, balancing type I/II errors. (2) The definition of financial strains should be examined more carefully. (3) There is a need for analytical research concerning the interaction between financial imbalances and the real economy.

Market anticipations of the housing – mortgage debt crisis

Although the subprime market was the trigger for the crisis, any one link in the highly leveraged financial intermediaries could have precipitated the crisis, as explained below. I now turn to the market anticipations of housing prices: the methods used and why they were so erroneous.

Gerardi et al. (2008) explore whether market participants could have or should have anticipated the large increase in foreclosures that occurred in 2007. They decompose the change in foreclosures into two components: the sensitivity of foreclosures to a change in housing prices times the change in housing prices. The authors conclude that investment analysts had a good sense of the sensitivity of foreclosures to a change in housing prices, but missed drastically the expected change in housing prices. The authors do not analyze whether housing was overvalued in 2005-06 or whether the housing price change was to some extent predictable. The authors looked at the records of market participants from 2004-2006 to understand why the investment community did not anticipate the subprime mortgage crisis. Several themes emerge. The first is that the subprime market was viewed as a great success story in 2005. Second, mortgages were viewed as lower risk because of their more stable prepayment behavior. Third, analysts used sophisticated tools but the sample space did not contain episodes of falling prices. Fourth, pessimistic feelings and predictions were subjective and not based upon quantitative analysis.

Analysts were remarkably optimistic about housing price appreciation (HPA). Those who looked at past data on housing prices, such as the four-quarter appreciation, could construct Figure 1. This is taken from Stein (2010). In the aggregate, housing prices never declined from year to year during the period 1980q1 – 2007q4. The mean appreciation was 5.4% p.a. with a standard deviation of 2.94% p.a. The optimism could be understood if one asks: on the basis of this sample of 111 observations, what is the probability that housing prices will decline? Given the mean and standard deviation, there was only a 3% chance that prices would fall. The best estimates of the analysts were that the rates of housing price appreciation CAPGAIN or HPA in 2005 - 2006 of 10 to 11% per annum would be unlikely to be repeated but that it would revert to its longer term average. A Citi report in December 2005 stated that "…the risk of a national decline in home prices appears remote. The annual HPA has never been negative in the United States going back at least to 1992." Consequently, no mortgage crisis was anticipated. There was no economic theory or analysis in this approach. It was simply a VaR value at risk implication from a sample based upon relatively recent data. More fundamentally, no consideration was given to the economic determinants of the probability distribution of capital gains or housing price appreciation.

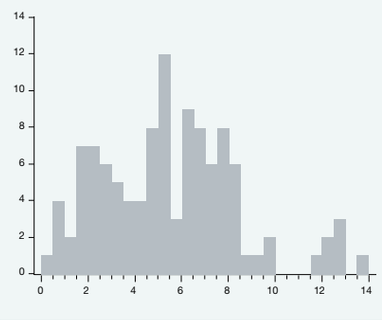

Figure 1
Histogram and statistics of CAPGAINS = Housing price appreciation (HPA), the change from previous 4-quarter appreciation of U.S. housing prices, percent/year, on horizontal axis. Frequency is on the vertical axis. Source of data: Office of Federal Housing Price Oversight. ADF (trend,intercept) = -2.09, Pr = 0.54.

Leveraging

It is now widely believed that "excessive" leveraging, an "excessive" debt ratio, at key financial institutions helped convert the initial subprime turmoil in 2007 into a full blown financial crisis in 2008. The ratio of debt L(t)/net worth X(t) is the debt ratio, and is denoted f(t) = L(t)/X(t). Leverage is the ratio of assets/net worth A(t)/X(t) and is equal to one plus the debt ratio. Although leverage is a valuable financial tool, "excessive" leverage poses a significant risk to the financial system. For an institution that is highly leveraged, changes in asset values highly magnify changes in net worth. To maintain the same debt ratio when asset values fall the institution must either raise more capital or it must liquidate assets. The relations are seen through equations (i) – (iv). In (i) net worth X(t) is equal to the value of assets A(t) less debt L(t). Equation (ii) is just a way of expressing the debt ratio. Equation (iii) relates the debt ratio f(t) = L(t)/X(t) to the leverage – the ratio A(t)/X(t) of assets/net worth. The "capital requirement" is net worth/assets X/A. It is the reciprocal of the leverage 1 + f(t). Greenspan stresses the importance of capital requirements in a reformed system. Equation (iv) states that the percent change in net worth dX(t)/X(t) is equal to the leverage (1+f(t)) times dA(t)/A(t) the percent change in the value of assets.

$$X(t) = A(t) - L(t). \quad \text{(i)}$$

$$L(t)/X(t) = f(t) = 1/[(A(t)/L(t) - 1]. \quad \text{(ii)}$$

$$A(t)/X(t) = 1 + f(t). \quad \text{(iii)}$$

$$dX(t)/X(t) = (1+ f(t))\, dA(t)/A(t). \quad \text{(iv)}$$

The Congressional Oversight Panel [COP (2009)] reported that, on the basis of recent estimates just prior to the crisis, investment banks and securities firms, hedge funds, depository institutions, and the government sponsored mortgage enterprises – primarily Fanny Mae and Freddie Mac – held assets worth U.S.$23 trillion on a base of U.S.$1.9 trillion in net worth, yielding an overall average leverage of A/X = 12. The leverage ratio or capital requirement, varied widely as seen in Table 1.

Consider the average, where A(t) = U.S.$23 trillion, X(t) = U.S.$1.9 trillion, L(t) = U.S.$21.1 trillion, then leverage A/X = 12. From equation (iv), a 3% decline in asset values would reduce net worth by dX(t)/X(t) = (12)(0.03) = 36%. The loss of net worth is equal to (0.36)($1.9 trillion) = $0.69 trillion. To maintain the same leverage, the institutions must either raise capital to offset the decline in asset values dX = dA < 0, or they must sell off assets to reduce their debt by the same proportion dL(t)/L(t) = dX(t)/X(t), derived from equation (ii). Both actions have adverse consequences for the economy. Firms in the financial sector, the financial intermediaries, are interrelated as debtors-creditors. Banks lend short term to hedge funds who invest in longer term assets and who may also buy credit default swaps. Firms that lost U.S.$690 billion in net worth would have difficulty in raising capital to restore net worth, without drastic declines in share prices. Similarly, the attempt by group G_1 to sell U.S.$630 billion in assets to repay loans will have

	Leverage	Capital requirement
Broker-dealers and hedge funds	27	.04
Government sponsored enterprises	17	.06
Commercial banks	9.8	.10
Savings banks	6.9	.14
Average	12	.08

Table 1 – Variations in leverage and capital ratios

serious repercussions in the financial markets. The prices of these assets will fall, and the leverage story repeats for other sectors. Institutions G_j who hold these assets will find that the value of their portfolio has declined, reducing their net worth. In some cases, there are triggers. When the net worth of a Fund G_j falls below a certain amount (break the buck) the fund must dissolve and sell its assets. These may include AAA assets. In turn, the sale of AAA assets affects group G_k. Investors in this group thought they were holding very safe assets, but to their dismay they suffer capital losses. The conclusion is that in a highly interrelated system, "high leverage" can be very dangerous. What seems like a small shock in one market can affect via leverage the whole financial sector. The Fed and the IMF seemed oblivious to this systemic risk phenomenon because of the history of two previous bubbles. In the S&L and agricultural crises of the 1980s, there was not a strong linkage between the specific sector and a highly leveraged interrelated financial sector based upon CDO and CDS. Consequently, the collapse of these earlier bubbles only had localized effects.

The disregarded warnings

Greenspan, Bernanke, and the IMF were insouciant, but there were Cassandras who warned of the housing price bubble and liklihood of a collapse. Shiller (2007) looked at a broad array of evidence concerning the recent boom in home prices, and concluded that it did not appear possible to explain the boom in terms of fundamentals such as rent and construction costs. Instead he proposed a psychological theory or social epidemic. This "explanation" is not convincing theoretically, and was not able to overcome the Jackson Hole Consensus. One can do much better than invoke vague phrases such as "epidemic," "contagion," or "irrationality."

From 1998 – 2005 rising home prices produced above average capital gains, which increased owner equity. This induced a supply of mortgages, and the totality of household financial obligations as a percent of disposable personal income rose. Figure 2 graphs the ratio of housing prices/disposable income PRICEINC and the debt service DEBTSERVICE, which is interest payments/disposable income. In figure 2, both variables are normalized, with a mean of zero and standard deviation of one. The rises in housing prices and owner equity induced a demand for mortgages by banks and funds. In about 45-55% of the cases, the purpose of the subprime mortgage taken out in 2006 was to extract cash by refinancing an existing mortgage loan into a larger mortgage loan. The

quality of loans declined. The share of loans with full documentation substantially decreased from 69% in 2001 to 45% in 2006 [Demyanyk and Van Hemert (2007)]. The ratio of debt/income rose drastically. The only way to service or refinance the debt was for the capital gain to exceed the interest rate. This is an unsustainable situation since it implies that there is a "free lunch" or that the present value of the asset diverges to infinity.

The fatal error was to ignore the fact that the quality of mortgages declined and that it was ever less likely that the mortgagors could service their debt from current income. Sooner or later the defaults would affect housing prices and turn capital gains into capital losses. The market gave little to no consideration of what would happen if the probability distribution/histogram would change. Both the supporters and the critics of the Jackson Hole Consensus agree that asset price bubbles are a source of danger to the real economy if the financial structure is fragile and not properly capitalized. The danger from "overvaluation" of housing prices is that the debt used to finance the purchase is excessive, which would lead to defaults and foreclosures.

It is seen in Figure 2 that the ratio PRICEINC = P(t)/Y(t) and the DEBTSERVICE ratio were stable, almost constant from 1980 almost to 2000. Then there was a housing bubble, the price/income shot up from 2000 to 2006. As a result of the rise in homeowner's equity the debt ratio rose – to finance consumption. The debt service ratio rose to two standard deviations above the longer term mean. The great deviation of the price/income ratio from its long term mean would suggest that there was a housing price "bubble" and that housing prices were greatly overvalued. A housing crisis would be predicted, when the ratio P(t)/Y(t) would return to the long term mean, which is the zero line. Households would then default on their mortgages and leverage would transmit the shock to the financial sector. The market – as well as the Fed – discounted

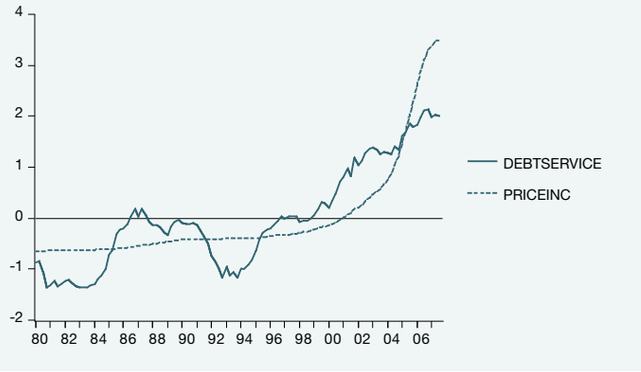

Figure 2
PRICEINC = Ratio of housing prices/disposable income. DEBTSERVICE = Debt service/disposable income. Both variables are normalized. FRED data set of the Federal Reserve Bank of St. Louis, Office of Federal Housing Enterprise Oversight.

that apprehension. There was no theory that could identify an asset price bubble and its subsequent effect upon the economy. The Jackson Hole Consensus ignored the microeconomy.

There were financial firms who may have had qualms about the sustainability of the housing price appreciation, but they assumed that they would be able to anticipate the onset of a crisis in time to retrench. Charles Prince's remark is emblematic: "When the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you've got to get up and dance." They certainly were mistaken, because they ignored systemic risk that the negative shock could be pervasive, and liquidity and capital would disappear in the wake of a mass exodus from the markets for derivatives. There were a few hedge firms such as Scion Capital (SC) that anticipated the crash and took appropriate actions. Michael Burry (2010) of SC realized in 2005 that the bubble would burst and acted upon that view. He purchased credit default swaps (CDS) on billions of dollars worth of both subprime mortgage-backed securities and bonds of many financial corporations that would be devastated when the real estate bubble burst. Then as the value of the bonds fell, the value of CDS would rise. The investors in this hedge fund still "wanted to dance" and profit from the rising house prices. Despite pressure from the investors, Burry liquidated the CDS at a substantial profit. But since he was operating in face of strong opposition from both his investors and from the Wall Street community, he shut down SC in 2008. Greenspan responded negatively to Burry's predictions and suggested that Burry was just lucky. Lowenstein (2010) describes the divergent opinions in the market where the pessimists were in the minority.

Capital requirements, desirable leverage

In his retrospective, Greenspan has qualified his unquestioned faith in the financial markets to allocate saving optimally to investment. The question is what should be done to rectify the problem? Regulation per se cannot be an improvement. Regulators are inclined to raise capital requirements to lower risk without considering expected return. He argues that there are limits to the level of regulatory capital if resources are to be allocated efficiently. A bank or financial intermediary requires significant leverage if it is to be competitive. Without adequate leverage, markets do not provide a sufficiently high rate of return on financial assets to attract capital to that activity. Yet, at too great a degree of leverage, bank solvency is at risk. The crucial question is what is a "desirable" degree of leverage? Since this is the main question of concern in my paper, I present Greenspan's views that I shall relate to below to my stochastic optimal control (SOC) analysis.

Greenspan suggests that the focus be on desirable capital requirements for banks and financial intermediaries. He starts with an identity, equation (i) or (ii) for the rate of return on net worth r(t). This is income/equity. Net worth and equity are used interchangeably here. I will use my notation above instead of his for the sake of consistency. Leverage is assets/

equity = A(t)/X(t) or capital requirement is X(t)/A(t). Net income is Y(t). Define net income/assets Y(t)/A(t) = b(t).

net income/equity = (net income/assets)(assets/equity) (i)
rate of return on equity r(t) = b(t) A(t)/X(t) (ii)

He observes that over the long run, there has been a remarkable stability in the ratio of net income/equity. It has ranged around 5% p.a. Call this long run value r. Greenspan considers the long run ratio r without a time index as a required rate of return to induce the U.S. banking system to provide the financial sector with the resources to promote growth. Equation (iii) must be satisfied. The minimum rate of return at any time r(t) should be equal to the long run value r.

min r(t) = b(t)A(t)/X(t) = r (iii)

Alternatively the maximum capital requirement X(t)/A(t) should satisfy (iv) or the minimum leverage should satisfy (v). If the capital requirement exceeds b(t)/r then – given the return on assets b(t) – the return on net worth falls below the required rate r.

max X(t)/A(t) = b(t)/r (iv)
min A(t)/X(t) = r/b(t) (v)

Given the estimate r = 0.05, and the ratio b(t) of income/assets in the years prior to the crisis b(t) = 0.012, the maximum capital requirement should satisfy (vi) or minimum leverage should satisfy (vii).

max X(t)/A(t) = b(t)/r = 0.012/0.05 = 0.24 (vi)
min A(t)/X(t) = 0.05/0.012 = 4.17 (vii)

The maximum capital requirement X(t)/A(t) is 0.24, or minimum leverage is 4.17. A capital requirement greater than 0.24 depresses the rate of return r(t) below the required rate r, and a leverage above 4.17 is unduly risky. As seen above, the average leverage was 12, a very risky situation. Greenspan's derivation of desirable leverage has several advantages but leaves open several questions. First, the advantage of (vi)-(vii) is that it is an attempt to find a capital requirement or leverage that is sufficient to attract capital into the financial system. Second, it is a time varying ratio that takes into account b(t) the return on assets. However, risk is not explicit in his formulation. There is no explicit trade off between growth and risk. Third, the required minimum return on equity r is arbitrary and lacks theoretical foundations. Third, it says nothing about the effects upon risk and growth of leverage or capital requirements that deviate from the value in (vi)-(vii). The SOC analysis in the next section attempts to rectify these difficulties where the objective is to find a debt ratio, leverage, or capital requirement that optimally balances expected growth against risk. The context is that the future is unpredictable, stochastic.

Stochastic optimal control (SOC)/dynamic risk management

Shojai and Feiger (2010), in their article "Economists' hubris – the case for risk management" – write that "…the tools that are currently at the disposal of the world's major global financial institutions are not adequate to help them prevent such crises in the future and that the current structure of these institutions makes it literally impossible to avoid the kind of failures that we have witnessed." The Fed, IMF, Treasury, and the market have lacked the appropriate tools of analysis. To his credit, Greenspan stressed the importance of the financial sector and debt to "optimally" allocate saving to investment. The social objective should be the maximization of the expectation of the logarithm of net worth over a given horizon. The current proposals for "financial reform" go to the other extreme. They focus almost exclusively upon risk reduction rather than upon the balance between risk and growth.

The approach that I now discuss concerns my recent work, which applies the techniques of stochastic optimal control (SOC) to derive an optimal debt ratio, optimal leverage, or capital requirement that "optimally" balances risk and expected growth – where the future is unpredictable/stochastic. I explain what the consequences are of a debt ratio (or capital requirement) that deviates in either direction from the derived optimal ratio. What are early warning signals (EWS) of a debt crisis? How successful were the EWS of the housing crisis? The theoretically derived early warning signal of a crisis is the excess debt ratio, equal to the difference between the actual and optimal ratio. The excess debt starting from 2004-05 indicated that a crisis was most likely. This SOC analysis should be used by those charged with surveillance of financial markets.

A sketch of the SOC approach will facilitate understanding the mathematical analysis below. The object is to select a leverage, ratio of debt/net worth, or capital requirement that will optimally balance growth and risk. Specifically the object is to maximize the expected logarithm of net worth at a future date. This is a risk averse strategy because the logarithm is a concave function. Declines in net worth are weighted more heavily than increases in net worth. In fact, very severe penalties are placed upon bankruptcy – a zero net worth. The growth of net worth is affected by leverage. An increase in debt to finance the purchase of assets increases net worth by the return on investment, but decreases the growth of net worth by the associated interest payments. The return on investment has two components. The first is the productivity of assets and the second is the capital gain on the assets. An increase in leverage will increase expected growth if the return on investment exceeds the interest rate. The productivity of assets is observed, the future capital gain, and the interest rates are unknown and are not observable when the investment decision is made. Figure 1 above is the histogram of the capital gain in housing.

The true stochastic process is unknown. One must specify the stochastic process on the capital gain and interest rate if one wants to select the optimal leverage – to maximize the expected logarithm of future net worth. Here I use a fairly general and realistic prototype model based upon Fleming and Stein (2004). Alternative formulations discussed in Stein (2005, 2006, 2010) imply similar qualitative but different quantitative results. The capital gain is the sum of two terms: a constant drift and a Brownian motion term. The interest rate has a similar structure: a constant drift plus a Brownian motion term. The capital gain and interest rate may be correlated. In addition, I constrain the trend of the capital gain to be equal to or less than the rate of interest, to exclude the "free lunch" described above. This is a realistic requirement, because the mean capital gain has been equal to the mean interest rate. Given the stochastic process, an optimal leverage or capital requirement is derived. It depends upon the productivity of assets, the drift of the capital gain less that of the interest rate, the variances, and covariances of the two variables. The optimum debt ratio or capital requirement is derived as follows. The expected growth of net worth is a concave function of the leverage. It is maximal when the optimal leverage is chosen. As the leverage exceeds the derived optimal, the expected growth declines and the variance/risk rises. If the debt ratio is less than the optimal, expected growth is unduly sacrificed to reduce risk.

Define the excess debt as the actual debt ratio less the optimal ratio. For a sufficiently high excess debt, the expected growth is zero or negative and the variance is high. The probability of a decline in net worth or a debt crisis is directly related to the excess debt ratio.

Some quants probably realized the inadequacy of estimating the drift based upon recent capital gains. This strategy was a delusion because the attempt to exit would confront a market with very little liquidity. The quants had the same model, were equally well trained, and would all try to get out at the same time. This produces a crash – with the associated fall out from leverage. Other quants kept searching for what is the best way to model the distribution function, but ignored the fact that it is determined by economics and not by nature. They ignored the "no free lunch constraint." The Fed, IMF, Treasury, and the quants/market lacked the appropriate tools of analysis to answer the following questions: what is an optimal leverage or capital requirement that balances the expected growth against risk? The excess debt starting from 2004-05 indicated that a crisis was most likely. Below, I will derive the early warning signals of the crisis. This SOC analysis should be used by those charged with surveillance of financial markets.

Performance criterion

One must have a performance criterion to answer the question: what is an optimal leverage in a stochastic environment. The function of a financial system is to allocate saving to investment to maximize the expected growth of the economy. Greenspan never loses sight of this objective, though "regulators" focus upon some measure of risk and ignore the growth aspect. The financial crisis was precipitated by the mortgage crisis and spread through the financial sector. At the beginning of the financial chain are the mortgagors/debtors who borrow from financial intermediaries – banks, hedge funds, government sponsored enterprises. The latter are creditors of the mortgagors, but who ultimately are debtors to institutional investors at the other end. For example, FNMA borrows in the world bond market and uses the funds to purchase packages of mortgages. If the mortgagors fail to meet their debt payments, the effects are felt all along the line. The stability of the financial intermediaries and the value of the traded derivatives, CDO, CDS, ultimately depend upon the ability of the mortgagors to service their debts.

As my criterion of performance, I consider maximizing the expected logarithm of net worth of the mortgagors. This is the growth variable that is consistent with Greenspan's view of the efficiency of financial markets. I focus upon the net worth of the mortgagors for two reasons. First, the entire structure of the derivatives rested upon the ability of the mortgagors to repay their debts. Hence I ask, what is the optimal debt ratio of the mortgagors? Second, I derive early warning signal that a bubble, the housing price bubble, is likely to collapse.

Let W(X,T) be the expected logarithm of net worth X(T) at time T relative to its initial value X(0). The stochastic optimal control problem is to select debt ratios f(t) = L(t)/X(t) during the period (0,T) that will maximize W(T) in equation (1). The maximum value is W*(X,T). Ratio f*(t) is the optimal leverage, and will vary over time. The solution of the stochastic optimal control/dynamic risk management problem tells us what is an optimal and what is an "excessive" leverage.

$$W^*(X,T) = \max_f E \ln [X(T)/X(0)], \; f = L/X = \text{debt/net worth} \quad (1)$$

The logarithm L(X) is a concave function of X(T). By Jensen's inequality if L(X) is a concave function, then the expected value E[L(X)] is less than or equal to the L[E(X)] the value of the expectation, equation (1a), (1b).

$$E[L(X)] \leq L[E(X)] \quad (1a)$$
$$E[\ln X(T)] \leq \ln [E(X(T)] \quad (1b)$$
$$\lim L[E(X)] \Rightarrow -\infty, \text{ as } E(X) \Rightarrow 0 \quad (1c)$$

As the expectation E[X(T)] goes to zero, the logarithm ln [E(X(T)] goes to minus infinity, equation (1c). Consequently, by (1b) the expectation E[ln X(T)] would go to minus infinity as E[X(T)] goes to zero. Low values of net worth close to zero may not be likely, but they have large negative utility weights. Hence the criterion function reflects strong risk aversion. Bankruptcy X = 0 is severely penalized. Criterion function (1) corresponds to the Greenspan's concept of optimization where both expected growth and risk are taken into account.

Dynamics of net worth

The mortgagors have a net worth X(t) equal to the value of assets, or capital, A(t) less debt L(t), equation (2). The value of assets or capital A(t) = P(t)Q(t) is the product of a deterministic physical quantity Q(t), for example an index of the "quantity" of housing, times the stochastic price P(t) of the capital asset – the housing price index. The value of assets and capital are used interchangeably.

$$X(t) = A(t) - L(t) = P(t)Q(t) - L(t) \quad (2)$$

The control variable is the debt ratio. The next steps are to explain the stochastic differential equation for net worth, relate it to the debt ratio, and specify what are the sources and characteristics of the risk and uncertainty. In view of equations (1), (2), focus upon the change in net worth dX(t) of the mortgagors. It is the equal to the change in the value of assets dA(t) less the change in debt dL(t). The change in the value of capital dA(t) = d(P(t)Q(t)) equation (3) has two components. The first is the change due to the change in price of capital asset, which is the capital gain or loss term, A(t)(dP(t)/P(t)). The second is investment in housing I(t) = P(t) dQ(t) the change in the quantity times the price.

$$dA(t) = d(P(t)Q(t)) = Q(t)dP(t) + P(t)dQ(t) = A(t)dP(t)/P(t) + I(t) \quad (3)$$

The change in debt dL(t), equation (4), is the sum of expenditures less income. Expenditures are the debt service i(t)L(t) at interest rate i(t), plus investment I(t) = P(t) dQ(t) plus C(t) the sum of consumption, dividends, and distributed profits. Income Y(t) = β(t)A(t) is the product of capital A(t) times its productivity. Variable β(t) is equivalent to Greenspan's return on assets. In the present context it is the imputed rental income from housing divided by the value of housing.

$$dL(t) = i(t)L(t) + P(t)dQ(t) + C(t) - \beta(t)A(t) \quad (4)$$

Combining these effects, the change in net worth dX(t) = dA(t) – dL(t) is equation (5).

$$dX(t) = dA(t) - dL(t) = A(t)[dP(t)/P(t) + \beta(t)\,dt] - i(t)L(t) - C(t)\,dt \quad (5)$$

Since net worth is the value of assets less debt, equation (6) describes the dynamics of net worth equation (5) in terms of the ratio f(t) = L(t)/X(t) of debt/ net worth and an arbitrary consumption ratio c(t) = C(t)/X(t) $\geq$ 0. Since leverage k(t) = A(t)/X(t) = (1+f(t)), the control variable could be either f(t) the debt ratio or k(t) the leverage.

$$dX(t) = X(t)\,\{(1 + f(t))\,[dP(t)/P(t) + \beta(t)\,dt] - i(t)\,f(t) - c(t)\,dt\} \quad (6)$$

The mortgagors borrow at interest rate i(t) and benefit from the capital gain dP(t)/P(t). Both variables are stochastic/unpredictable. What is the optimum debt ratio, leverage or capital requirement? The optimization of (1) subject to (6) depends upon the stochastic processes underlying the capital gain dP(t)/P(t), productivity of capital β(t) and interest rate i(t) variables. The productivity of capital β(t) is always observable but changes over time. However, the change in price dP(t) from t to t+dt and future interest rates are unpredictable, given all the information through present time t. The derived optimal debt ratio, leverage, or capital requirement will depend upon the specification of the stochastic processes of the capital gain and interest rate.

In the next section I specify the stochastic processes in the prototype model that seem to be consistent with the data and thereby derive the optimal debt ratio and expected growth rate of net worth.

Optimization in the prototype model

The model that I use for optimization describes the stochastic process of the capital gain as equation (7) and the interest rate as equation (8). Call this the prototype model [Fleming and Stein (2004)]. Alternative specifications, such as used in Stein (2005, 2010) yield similar qualitative, but not quantitative, results. The capital gain dP(t)/P(t) has a constant drift or mean πdt and a diffusion or stochastic term $\sigma_p dw_p$. The expectation of the stochastic term is zero and its variance is σ_p^2dt. Similarly the interest rate has a mean or expectation of i dt and a variance of σ_i^2dt. The correlation between the capital gain and interest rate is $E(dw_p dw_i) = \rho\,dt$, $1 \geq \rho \geq -1$.

$$dP(t)/P(t) = \pi dt + \sigma_p\,dw_p \quad (7)$$

$$i(t) = i\,dt + \sigma_i dw_i \quad (8)$$

$$E\,dw_p = E\,dw_i = 0,\ E(dw_i^2) = dt,\ E\,(dw_p^2) = dt,\ E(dw_i dw_p) = \rho\,dt.$$

Substitute (7) and (8) into equation (6) and derive the stochastic differential equation for net worth, equation (9). The performance criterion is the expected logarithm of net worth. This is the growth variable that an efficient financial system should optimize, as Greenspan stresses.

Using the Ito equation, the change in the logarithm of net worth is equation (10) whose expectation is equation (11). This is the crucial equation for determining the optimum debt ratio/leverage or capital requirement.

$$dX(t)/X(t) = [(1+f(t))(\pi + \beta(t) - if(t) - c(t)]\,dt + [(1+f(t))\sigma_p dw_p - f(t)\,\sigma_i dw_i] \quad (9)$$

$$d\ln X(t) = [(1+f(t))(\pi + \beta(t)) - if(t) - c(t)]\,dt + [(1+f(t))\,\sigma_p dw_p - f(t)\,\sigma_i dw_i] - (1/2)$$
$$[(1+f(t))^2\sigma_p^2 + f(t)^2\sigma_i^2 - 2\,(1+f(t))f(t)\,\sigma_i\sigma_p\,\rho]dt \quad (10)$$

$$E\,d\ln X(t) = [(1+f(t))(\pi + \beta(t)) - if(t) - c(t)]\,dt - (1/2)[(1+f(t))^2\sigma_p^2 + f(t)^2\sigma_i^2 -$$
$$2(1+f(t))f(t)\,\sigma_i\sigma_p\,\rho]dt \quad (11)$$

It is convenient and edifying to call the first term in equation (11) the "mean"

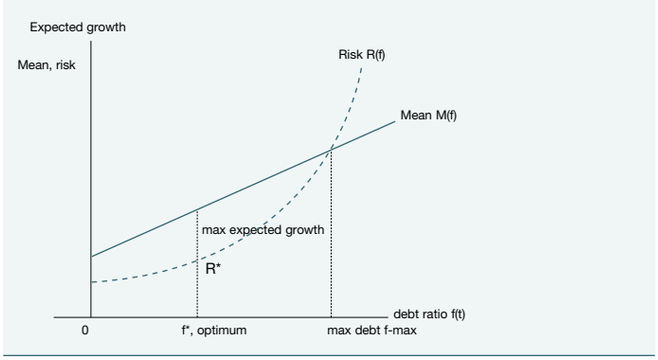

Figure 3
Expected growth of net worth, E [dlnX(t)] = M[f(t)] – R[f(t)].
A = assets, L = liabilities, net worth X = A – L.
Debt ratio f(t) = L(t)/X(t). Leverage A(t)/X(t) = 1 + f(t).
Mean $M[f(t)] = [(1+f(t))(\pi + \beta(t)) - if(t) - c(t)];$
Risk $R[f(t)] = (1/2)[(1+f(t))^2\sigma_p^2 + f(t)^2\sigma_i^2 - 2\,(1+f(t))f(t)\,\sigma_i\sigma_p\,\rho]$
Risk $R[f(t);\ \rho = 0] = (1/2)[(1+f(t))^2\sigma_p^2 + f(t)^2\sigma_i^2]$
$f^* = \text{argmax}\,[M(f) - R(f)|\ \rho = 0] = [\pi + \beta(t) - i - \sigma_p^2]/[\sigma_p^2 + \sigma_i^2]$
Excess debt = $\Psi(t) = f(t) - f^*(t)$.

M[f(t))] and the second term the "risk" R[(f(t))]. Thus the expected change in the logarithm of net worth is equation (11a) graphed in Figure 3.

$$E[d\ln X(t)] = M[f(t))] - R[(f(t))] = \text{expected growth} \quad (11a)$$

The mean M[f(t)] is a linear function of the debt ratio. It is positively sloped insofar as $(\pi + \beta(t) - i) > 0$. The intercept is $(\pi + \beta(t) - c(t))$. As long as π the mean capital gain plus the current productivity of capital $\beta(t)$ exceeds i the mean interest rate, the mean rises linearly with the debt ratio. If there were no risk, then expected growth can be increased by increasing leverage.

Risk R[f(t)] is a quadratic function of the debt ratio or leverage. It depends upon the variances of the capital gain and interest rate and the correlation ρ between these variables. It is probably realistic to assume that the correlation between the capital gain and interest rate is negative. Declining interest rates stimulate capital gains, and rises in interest rates reduce capital gains. For simplicity, I'll work with the case where the $\rho = 0$ two stochastic terms are independent. The prototype model in Fleming and Stein covers the general case.

The optimum debt ratio/leverage f* is equation (12), when $\rho = 0$. It is the debt ratio that maximizes the difference between mean and risk. It optimally balances the mean growth against the risk. In figure 3, optimum debt ratio f*(t) is assumed to be positive.

$$f^* = \text{argmax}\,[M(f) - R(f)|\ \rho = 0] = [\pi + \beta(t) - i - \sigma_p^2]/[\sigma_p^2 + \sigma_i^2] \quad (12)$$

Define excess debt $\Psi(t) = f(t) - f^*$ as the difference between the actual debt ratio f(t) and the optimal f*(t). As the debt ratio exceeds the optimum f* the mean continues to rise but at a slower rate than risk. There is an "excess debt" or an excess risk as f(t) rises above the optimum. When f = f-max, the expected growth is zero and above it, the expected growth is negative. A warning signal that too much risk has been undertaken is the excess debt $\Psi(t) = f(t) - f^*$ is large. Alternatively, leverage is excessive when the debt ratio exceeds f*(t). The probability of a crash increases with the excess debt. The capital requirement A/X = 1/[1+f(t)] is optimal when f(t) = f* and is too low for debt ratios above f*. This SOC approach is related below to Greenspan's analysis of desirable capital requirements described above.

Capital requirements: Greenspan compared to SOC

As a result of the crisis, Greenspan qualified his trust in the financial markets to optimally allocate resources to promote growth. Instead, as pointed out above, he proposed the maximal capital requirement X(t)/A(t) as (vi) or minimum leverage A(t)/X(t) as (vii), repeated here. If the capital requirement exceeded 0.24 then the rate of return would be less than the required rate of return of r = 5% pa, the long run value.

$$\max X(t)/A(t) = b(t)/r = 0.012/0.05 = 0.24 \quad (vi)$$
$$\min A(t)/X(t) = 0.05/0.012 = 4.17 \quad (vii)$$

Greenspan stressed the trade-off. Without adequate leverage, markets do not provide a rate of return on financial assets sufficient to attract capital to that activity. Yet, at too great a degree of leverage, bank solvency is at risk.

As mentioned above, there are several difficulties with his formulation. There is no explicit trade-off between growth and risk. Risk is not explicit in his formulation. The required minimum return on equity r is arbitrary and lacks theoretical foundations. His formulation says nothing about the effects upon risk and growth of leverage or capital requirements that deviate from the value in (vi)-(vii).

The SOC analysis attempts to rectify these difficulties where the objective is to find a debt ratio or leverage or capital requirement that optimally balances expected growth against risk. Equation (12) above is the debt ratio f*(t) = L*(t)/X(t), which optimally balances expected growth against risk, when the capital gain and interest rate are independent. The optimal leverage A*/X = 1 + f*. The general case when the capital gain and interest rate are correlated is derived from equation (11).

$$f^* = L^*/X = \text{argmax}\,[M(f) - R(f)|\ \rho = 0] = [\pi + \beta - i - \sigma_p^2]/[\sigma_p^2 + \sigma_i^2] \quad (12)$$

This is a general formulation that can be applied to any sector. In the case of the housing sector, historically the mean capital gain was $\pi = 5.4\%$,

with a standard deviation of 2.9%, shown in histogram Figure 1. The 30-year conventional mortgage rate of interest from 1998 to 2007 ranged between 7.5% and 6%. If we assume that the difference ($\pi - i$) between the mean interest rate and the mean capital gain is not significant, then the optimal debt ratio for the housing sector from (12) is (13).

$$f^* = L^*/X = \text{argmax}\,[M(f) - R(f)|\ \rho = 0] = [\beta - \sigma_p^2]/[\sigma_p^2 + \sigma_i^2] \quad (13)$$

The optimum debt ratio depends upon (i) the current productivity of capital $\beta(t) = Y(t)/A(t)$ = income/assets, and (ii) risk elements that are captured by the two variances (and covariance's in the general case). As shown in figure 3, this debt ratio f* or leverage A/X = 1+f* maximizes expected growth M(f*) – R(f*), when risk is taken into account. The optimal risk is R* in Figure 3. When f(t) is below f* then expected growth is sacrificed unduly. When f(t) is above f* then expected growth is unduly sacrificed and risk is excessive. Equation (12) generalizes what Greenspan's equations (vi)-(vii) try to do.

Early warning signals of the crisis

The financial crisis was precipitated by the mortgage crisis for several reasons. First, a whole structure of financial derivatives was based upon the ultimate debtors – the mortgagors. When the mortgagors were unable to service their debts, the values of the derivatives fell. Second, the financial intermediaries whose assets and liabilities were based upon the value of derivatives were very highly leveraged. Changes in the values of their net worth were large multiples of changes in asset values. Third, the financial intermediaries were closely linked – the assets of one group were liabilities of another. A cascade was precipitated by the mortgage defaults. Fourth, the "quants" underestimated the fact that, since they were following the same rules, the markets would not be liquid "when the music stopped."

For these reasons, I focus upon the excess debt of the mortgagors. The whole structure of derivatives rested upon the mortgagors being able to service their debts. Hence my basic question is: did the debt ratio of the mortgagors significantly exceed f-max in Figure 3?

The application of the SOC analysis is done in several steps. First, on the basis of the analysis above, I derive estimates of the excess debt $\Psi(t) = f(t) - f^*(t)$ that lowered the expected return and raised risk. Early warning signals (EWS) are thereby derived. The bubble was generated by the market view that the trend of prices, the capital gains, would continue to exceed the long run mean, which was close to the mean rate of interest. Thereby the mortgagors could continue to live beyond their mean, and ignored their inability to repay based upon their incomes. An excess debt was selected. The collapse occurred when the capital gain fell below the rate of interest: the "free lunch" was over. Defaults and bankruptcies occurred.

Estimates of excess debt, early warning signal of a crisis

An early warning signal of a debt crisis is a series of excessive debts $\Psi(t) = f(t) - f^*(t) > 0$. As shown in Figure 3 when the debt ratio f(t) exceeds f-max, M[f(t)] < R[f(t)], the expected growth is negative and the risk is high. The next question is: What are the appropriate measures of the actual and the optimal debt ratio to evaluate excess debt $\Psi(t)$? The debt ratio that I use in empirical work is the ratio of household debt as a percent of disposable income, since I do not have estimates of net worth. In order to make alterative measures of the debt ratio and key economic variables comparable, I use normalized variables where the normalization (N) of a variable Z(t) called N(Z) = [Z(t) – mean Z]/standard deviation. The mean of N(Z) is zero and its standard deviation is unity. The normalized debt ratio is equation (14) and is graphed in Figure 4.

DEBTRATIO = N[f(t)] = [debt/disposable income – mean]/standard deviation (14)

The optimum debt ratio f* is based upon equation (13) – repeated here – since the mean capital gain of 5.4% per annum with a standard deviation of 2.9% was not significantly different from "the mortgage rate of interest," ($\pi - i$) = 0. This formulation is qualitatively, but not quantitatively, consistent with alternative theoretical measures of the optimum debt ratio implied by alternative stochastic processes.

$$f^* = L^*/X = \text{argmax}\,[M(f) - R(f)|\ \rho = 0] = [\beta(t) - \sigma_p^2]/[\sigma_p^2 + \sigma_i^2] \quad (13)$$

The term $[\beta(t) - \sigma_p^2]/[\sigma_p^2 + \sigma_i^2]$ represents the "fundamental" determinants of the optimal debt ratio. We must estimate $\beta(t)$, the productivity of assets. The productivity of housing assets is the (implicit net rental income/value of the home) plus a convenience yield in owning one's home. Assume that the convenience yield in owning a home has been relatively constant. Approximate the return $\beta(t)$ by using the ratio of rental income/value of housing. The productivity of assets is income/value assets = $Y(t)/A(t) = Y(t)/Q(t)P(t)$, where Y(t) is rental income, P(t) is an index of housing prices and Q(t) is an index of the physical quantity of housing. Therefore, $\beta(t)$ is proportional to a ratio of rental income to an index of housing prices. Since the units of numerator and denominator differ, it makes sense to use normalized variables to estimate $\beta(t)$ the productivity of assets. Call the normalized ratio rental income/index of housing prices RENTPRICE in equation (15).

The term $[(\beta(t) - \beta)]$ is the deviation of the current return on assets from its mean value over the entire period. In figure 4/equation (15) variable RENTPRICE is the normalized return, measured in units of standard deviation from the mean β. It is the (rental income/index of housing prices – mean)/standard deviation.

$$N(f^*(t)) = [[(\beta(t) - \beta]/\sigma(\beta) = RENTPRICE \quad (15)$$

Variable N(f*(t)) in equation (15) corresponds to the optimal debt ratio in equation (13). Both the actual (DEBTRATIO) and optimal (RENTRPRICE are graphed in normalized form in Figure 4.

The next question is how to estimate the excess debt $\Psi(t)$. I estimate excess debt $\Psi(t) = (f(t) - f^*(t))$ by using the difference between two normalized variables $N(f(t)) - N(f^*(t))$, equation (16). This difference is measured in standard deviations.

$$\text{Excess debt} \sim N[f(t)] - N[f^*(t)] = DEBTRATIO - RENTRATIO \quad (16)$$

Excess debt $\Psi(t)$ corresponds to: (i) the difference $[f(t) - f^*(t)]$ on the horizontal axis in Figure 3, measured in standard deviations, and (ii) the difference between the two curves DEBTRATIO and RENTPRICE in Figure 4. The probability of a decline in net worth $Pr(d\ln X(t) < 0)$ in (17) is positively related to $\Psi(t)$ the excess debt for the following reason. As the excess debt rises, the expected growth declines because risk R(f) increases relative to M(f) mean in Figure 3.

$$Pr(d \ln X(t) < 0) = H(\Psi(t)),\ H' > 0 \quad (17)$$

Assume that over the entire period 1980 – 2007 the debt ratio was not excessive. During the period 2000 – 2004, the high capital gains and low interest rates induced rises in housing prices relative to disposable income and led to rises in the debt service ratio. By 2005 – 06 the ratio of housing price/disposable income (PRICEINC in Figure 2) was about three standard deviations above the long-term mean. This drastic rise alarmed several economists such as Shiller (2007) who believed that the housing market was drastically overvalued. As indicated in above, Greenspan was not unduly concerned with this phenomenon.

The advantages of using excess debt $\Psi(t)$ in Figure 4 as an early warning signal compared to just the ratio of housing price/disposable income are that $\Psi(t)$ focuses upon the fundamental determinants of the optimal debt ratio as well as upon the actual ratio. The probability of declines in net worth, the inability of the mortgagors to service their debts, and the financial collapse and a crisis due to leverage are directly related to the excess debt. In the most general way, Figure 4 should be viewed as follows. When the DEBTRATIO is above (below) its mean, the RENTPRICE should be above (below) its mean. When the debt ratio rose significantly above its mean, were the "fundamentals" measured by RENTPRICE above its mean? The optimal debt ratio RENTPRICE declined below the mean from 1996 and by 2007 it was 1.5 standard deviations below the mean. The actual debt ratio DEBTRATIO grew steadily above the mean from 1998 and by 2007 was 2 standard deviations above the mean. Thus the excess debt grew to 3 standard deviations above the mean from 1998 to 2007.

Figure 4
Early warning signals: Excess debt $\Psi(t) = N[f(t)] - N[f^*(t)]$.
$N[f(t)]$ = DEBTRATIO = (household debt as percent of disposable income – mean)/standard deviation. $N[f^*(t)]$ = RENTPRICE = (rental income/housing price index – mean)/standard deviation.
Source: FRED

This is a clear measure of an excess debt and a bubble. The actual debt was induced by capital gains in excess of the interest rate. The debt could only be serviced from capital gains. This situation is unsustainable. When the capital gains fell below the interest rate, the debts could not be serviced from income. A crisis was inevitable. Thus the excess debt in Figure 4 was an early warning signal of a crisis.

Conclusion

Alan Greenspan's paper presented his retrospective view of the crisis. Two main themes emerge. First, the housing price bubble, its subsequent collapse and the financial crisis were not predicted either by the market, the Fed, the IMF or the regulators in the years leading to the current crisis. Second, the Fed, IMF, Treasury and the "quants"/market lacked the appropriate tools of analysis to answer the following questions: what is an optimal leverage or capital requirement that balances the expected growth against risk? What are theoretically founded early warning signals of a crisis? What lessons should be learned?

The Fed apparently lacked adequate tools which might have indicated that asset values were vastly out of line with fundamentals. They were not searching for such tools because they did not believe that they could or should look for misaligned asset values or excess debt, despite warnings from Shiller and some people in the financial industry. They were blindsided by the Jackson Hole Consensus which gave them great comfort in adopting a hands off position. So it was not just a lack of appropriate tools which undid the Fed; it was a complete lack of appreciation of what its role should be to head off an economic catastrophe. There are two separate but related questions: are identification and containment of a financial bubble legitimate activities of the Fed, and if they are, what are the best tools to carry out this analysis? As the

Fed answered “no” to the first question, it saw no need to address the second question.

The Jackson Hole Consensus explains to a considerable extent the Fed’s behavior. Greenspan has great knowledge of financial markets and did have some qualms about the housing boom. I think that his behavior can be explained rationally. First, he understands that the function of financial markets is to channel saving into investment in the optimal way to promote growth. Second, like most of the economics profession, he accepted the generality of the First Theorem of Welfare Economics. This theorem [Koopmans and Bausch (1959)] states that a competitive equilibrium is a Pareto optimum. A competitive equilibrium is a vector of prices, where (i) supply equals demand, (ii) consumers optimize demand and their supply of labor services, given their preferences and (iii) producers optimize by maximizing their profits, given the technology. A Pareto optimum is a vector of choices such that (iii) supply equals demand and (iv) it is not possible to select vectors which would make some people better off without making others worse off. The implication is that “market regulation” is superior to regulation by bureaucrats and politicians. Do not try to second guess the markets.

The belief in the generality of the First Theorem of Welfare provided a basis for Greenspan’s position. The theorem does not hold in financial market because the assumption of atomistic agents operating in perfectly competitive markets with full information and stable preferences is wildly unrealistic. The clearly imperfect markets operating with agents acting without full information concerning the values of the complex derivatives, in fact almost complete ignorance, implies the conclusion that the situation before the crash cannot be considered to be a Pareto optimum.

When the crash occurred, Greenspan (2008) wrote, “Those of us who have looked to the self-interest of lending institutions to protect stockholders’ equity, myself included, are in a state of disbelief.” To his great credit, in his retrospective Greenspan qualified his trust in financial markets to optimally allocate resources by advocating minimum capital requirements or maximum leverage. His object was to have a minimum capital requirement to yield a rate of return on equity sufficient to provide the financial sector with resources to promote growth. The proposals for reform and the regulators ignore this and just focus upon some arbitrary risk measures.

Greenspan’s formulation is a step in the right direction, however, there are several limitations to his formulation. There is no explicit trade off between growth and risk. Risk is not explicit in his formulation. His required minimum return on equity is arbitrary and lacks theoretical foundations. His formulation says nothing about the effects upon risk and growth of leverage or capital requirements that deviate from the value from his derived estimate.

The stochastic optimal control analysis attempts to rectify these difficulties. I drive an optimal debt ratio or leverage or capital requirement that optimally balances expected growth against risk, in an environment where the capital gain and interest rate are stochastic. The stochastic optimal control analysis developed here derives a time varying optimal debt ratio. The crucial variable is the excess debt, the difference between the actual and optimal debt ratio. (1) The optimum debt ratio or leverage maximizes the expected growth of net worth. (2) As the excess debt ratio rises, the expected growth of net worth declines and the risk rises. (3) The probability of a crisis is positively related to the excess debt, measured in standard deviations. When the leverage exceeds a specified value, the expected growth of net worth is negative and the risk is high. (5) The derived early warning signal, the excess debt ratio, would have clearly predicted the crisis, as shown in Figure 4.

Peter Clark (2009) wrote: “no measure of underlying or fundamental value will provide consistently accurate predictions of emerging bubbles, but the prior question is whether it is useful to even contemplate the exercise of assessing market values. In light of the huge costs of the housing and credit bubble, the answer must be in the affirmative.” Fed Vice Chairman Kohn indicated that the Fed’s thinking may have changed. He wrote (2009, quoted by Clark): “As researchers, we need to be honest about our very limited ability to assess the ‘fundamental value’ of an asset or to predict its price. But the housing and credit bubbles have had a substantial cost. Research on asset prices … should help to identify risks and inform decisions about the costs and benefits from a possible regulatory or monetary policy decision attempting to deal with a potential asset price bubble.”

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Share Price Disparity in Chinese Stock Markets[1]

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Abstract

The presence of price disparity between A- and H-shares suggests that the two markets are segmented and thus allocation of capital is inefficient. In this paper, we attempt to identify the factors contributing to the price disparity, with a view to helping policymakers find solutions to the problem. Our results suggest that the disparity is caused by a combination of micro and macro factors. Some of these factors are found to have played a crucial role in determining the disparity, implying that removing or reducing the segmentation can potentially bring considerable benefits by improving price discovery and market efficiency.

1 This article is also published as Chapter 10 of Genberg, H. and D. He (eds.) 2008, Macroeconomic linkages between Hong Kong and Mainland China, City University of Hong Kong Press.

The presence of persistent price disparity between A- and H- shares suggests that the two markets are segmented and thus allocation of capital is inefficient. In this paper, we attempt to answer probably the most fundamental question on the phenomenon, identifying the factors contributing to the price disparity, with a view to helping policymakers find solutions to the problem. This paper complements the analysis of the changes in the price disparity by Peng et al. (2007).[2]

Internationally, when price disparity exists between two shares of the same stock, the one accessible by foreign investors usually commands a premium over the one restricted only to domestic ownership. However, almost all H- shares, which are accessible by foreign investors, are traded at a discount to their counterparts in the A-share market on the Mainland. Nonetheless, this should not be seen as an inconsistency because in most other emerging markets shares accessible by foreign investors are also open to domestic investors – which leaves no opportunity for any discount to exist – while in the Chinese case foreign and domestic investors do not have access to each other's markets.[3]

Whether one tries to explain a premium (in the case of other emerging markets) or a discount (in the case of the Chinese markets) should not have any implications for the approaches adopted in empirical studies. Previous studies on price disparity in segmented stock markets are fairly diverse in terms of model specification, due to different hypotheses or explanations. However, despite the diversity, the hypotheses or explanations focus mainly on five factors, namely, market liquidity, shares supply, market risk, information asymmetry, and general market conditions – in particular in those studies of the Chinese markets (Table 1). All of these are plausible factors contributing to the stock price disparity from a micro perspective. No empirical work has, according to our knowledge, considered the channels through which recent macroeconomic imbalance of China's economy has played an increasingly important role.

The macroeconomic imbalance has arguably impacted the prices of the A- and H-share markets, and hence their disparity, in at least three ways. First, an undervalued currency and thus expectations of future revaluation or appreciation have provided strong motivation for foreign investors to acquire H-shares as a proxy for "renminbi" assets, though H-shares, which are denominated in Hong Kong dollars, are not renminbi assets per se. Second, the external imbalance resulting from an undervalued renminbi has been manifested into rising internal imbalance as evidenced by rapidly growing bank deposits. With limited choice of financial products available domestically, stock investments, in addition to real estate investments, have offered a convenient and feasible alternative to bank deposits for the majority of mainland investors. Finally, as China's trade surplus continues to rise, the opportunities for mainlanders to retain their foreign currency proceeds outside the mainland to avoid capital controls have increased. This in turn reflects increased ability of mainlanders to arbitrage by purchasing the H-share of the same stock whenever they find the discount offered by the H-share attractive enough.

Preliminary analysis

Both the price and quantity data of A- and H-shares are monthly averages of daily data extracted from Bloomberg, covering the period from April 2000 to February 2007.[4] It is useful to note that this period saw significant growth in the market, with the number of dual-listed stocks more than doubling from 17 to 36 (Table 2) and, even after controlling for price increases, the size of the market capitalization had expanded 16 times.[5] In Figure 1, we plot the indices of the market capitalization of the dual-listed A- and H-shares over time, with all stock prices held constant at their February 2007 levels. As can be seen, in April 2000 the A- and H-share markets – controlled for price changes – were only about 6% of the market size reached in February 2007. This is particularly important when comparing results with previous studies, because the A-H market today is quite different from what it used to be in the 1990s (covered by most other studies).

Next, we compute the Divisia (1925) indices, correlations, and variances of the A- and H-shares to provide a simple view of the relationship between their respective returns over time.[6] When applied in the current context, the Divisia price index is a market-capitalization-weighted average of logarithmic price changes (returns). In the computation, share prices are adjusted for changes in the exchange rate. Figure 2 presents the scatter plot of the Divisia A- and H-share price indices where each point corresponds to a specific month. The dispersion of the Divisia A- relative to H-share price index and their deviations from the 45-degree line reflect the degree of segmentation between the two markets. There appears to be only a mild positive relationship between the returns of A- and H-shares. This is consistent with Figure 3 which shows that the two indices exhibit a slight tendency to move in tandem, especially from around 2003 Q3.

2 While identifying the factors affecting the price disparity can also shed light on the changes in the price disparity, the latter paper differs in that it studies the changes or dynamics by examining the statistical properties of the disparity itself.

3 Foreign investors have in recent years been able to access the A-share market via the qualified foreign institutional investors scheme but the access has remained very limited. During the period under study, the qualified domestic institutional investors scheme was limited to fixed income products and there was no formal channel for mainland investors to access the H-share market. However, it was recently announced that this rule will be relaxed, allowing mainland investors to invest in overseas equities.

4 The earliest available record for all 17 stocks on Bloomberg is April 2000, although the history of dual-listed A- and H-shares dates as far back as 1993. There are two reasons for not covering the whole dual-listing history in this study. First, we want to maintain a higher degree of data consistency by using one data source. Second, and more importantly, the market in the 1990s was too small (compared to the market today) to have any useful policy relevance.

5 Since February 2007, the number of dual-listed stocks has increased to 39.

6 We employ the Divisia index instead of other more commonly used indices such as the Paasche, Laspeyre and Fisher indices, because its higher-order moments can capture the relationship among individual stock price changes while others cannot.

Author(s)	Markets	No. of Firms	Period	Factors
Ng and Wu (2007)	A-shares	32% of total market turnover trade on SH	2001-2002	Risk, market conditions
Guo and Tang (2006)	A- versus H-shares	29 A/H shares	1993-2003	Cost of capital, liquidity
Chan and Kwok (2005)	A- versus H-shares and A- versus B-shares	13 A/H shares 41 A/B shares	1991-2000	Liquidity, supply, risk, information asymmetry
Wang and Li (2003)	A- versus H-shares	16 A/H shares	1995-2001	Liquidity, risk, market conditions, exchange rate
Fung et al. (2000)	A- versus B-shares	20 A/B shares	1993-1997	Dividend yield, exchange rates, bond yield
Sun and Tong (2000)	A- versus B-shares A- versus H-shares	45 A/B shares 10 A/H shares	1994-1998	Risk, bond issued, number of listed firms, information asymmetry, foreign reserves, inflation, liquidity
Su and Fleisher (1999)	A- versus B-shares	24 A/B shares	1993-1997	Risk, number of investors, information asymmetry
Chakravarty et al. (1998)	A- versus B-shares	39 A/B shares	1994-1996	Risk, information asymmetry, supply
Ma (1996)	A- versus B-shares	38 A/B shares	1992-1994	Market conditions, Chinese deposit rates, CPIs of China and U.S.
Chen et al. (2001)	A- versus B-shares	36 (SHSE) and 32 (SZSE) A/B shares	1992-1997	Risk, information asymmetry, liquidity
Bailey (1994)	A- versus B-shares	14 A/B shares	1992-1993	Market conditions

The above summary focuses on the modeling of the cross-sectional data in panel data analysis. In the literature, the liquidity factor is represented by the trading volume (or the ratio to market capitalization or the ratio to total trading volume) and bid-ask spread. The risk factor is represented by the volatility of prices and variance-covariance ratios. The supply factor is represented by the total outstanding shares and tradable market shares. The information asymmetry factor is reflected by total market capitalization. The factor of market conditions is proxied by the market returns.

Table 1 – Literature review on Chinese stock markets

The Divisia A-H share correlation shows the co-movement between A- and H-shares. As can be seen in Figure 4, their relationship is found to be positively correlated in most of the period. It is also noted that the Divisia correlation averaged about 0.2 initially and then trended higher from around the beginning of 2003, reaching about 0.6 by the end of the period. Hence, gradual integration between the two markets seems to have taken place over the past four years. This result is consistent with the finding of Peng et al. (2007) that there was relative price convergence between the A- and H-shares of the dual-listed stocks.

The Divisia variance is the second-order moment of individual stock prices, which measures the extent to which the prices of individual stocks change disproportionately. In other words, it is a measure of relative price changes, not absolute price changes. When all prices change by the same proportion, it vanishes. Scatter plots of the monthly Divisia A- and H-share price variances for the past seven years are presented in Figure 5, with the top panel including all observations and the bottom panel excluding the outliers defined as larger than 0.01. In both cases, there are about two-thirds or 66% of observations lying above the 45-degree line. In other words, for the dual-listed stocks, A-shares tend to have a smaller Divisia variance than do H-shares, indicating that the prices of A-shares tend to move more in tandem, when compared with those of H-shares. There must exist some common forces that drive stock prices in the A-share market to go in one direction or the other, resulting in a smaller dispersion of price movements. What could these common forces be? The rest of the paper will shed some light on this question.

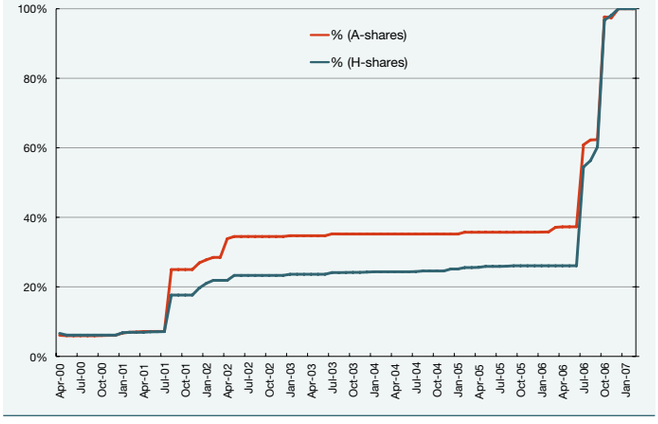

Figure 1 – The market capitalization (Feb 2007 = 100%)

Model specification

To examine the relevance of the various possible factors leading to the price disparity, we employ a fixed effect panel data model in our estimation. A panel data model allows us to analyze the disparity for a large number of firms simultaneously using time series data, while a fixed effect structure can help control for unobservable firm-specific effects, so that differences across companies can be captured.[7] Specifically, the regression model is as follows:

$$PREM_{it} = \alpha_0 + \alpha_1 LQ_{it} + \alpha_2 SP_{it} + \alpha_3 RK_{it} + \alpha_4 INF_{it} + \alpha_5 MC_{it} + \alpha_6 CUR_{it} + \alpha_7 M2_{it} + \alpha_8 TR_{it} + \alpha_9 PREM_{it-1} + \eta_i + \varepsilon_{it} \quad (1)$$

where subscripts i and t denote stock i and time t respectively. The

7 See Domowitz (1997) and Hsiao (1986) for details.

No	Company	H-shares ticker	A-shares ticker
1	Luoyang Glass	1108	600876
2	Nanjing Panda	553	600775
3	Northeast Electric	42	000585
4	Shandong Xinhua Pharmaceutical	719	000756
5	Sinopec Yizheng Chemical Fibre	1033	600871
6	Beijing North Star	588	601588
7	Beiren Printing Machinery	187	600860
8	Jingwei Textile Machinery	350	000666
9	China Eastern Airlines Corp	670	600115
10	Tianjin Capital Environmental Protection	1065	600874
11	Guangzhou Pharmaceutical	874	600332
12	Sinopec Shanghai Petrochemical	338	600688
13	Jiangxi Copper	358	600362
14	China Southern Airlines	1055	600029
15	Guangzhou Shipyard International	317	600685
16	China Petroleum & Chemical Corp	386	600028
17	Guangshen Railway	525	601333
18	Jiaoda Kunji High-Tech	300	600806
19	Dongfang Electrical Machinery	1072	600875
20	Air China	753	601111
21	Bank of China	3988	601988
22	Datang International Power Generation	991	601991
23	ZTE Corp	763	000063
24	Jiangsu Expressway	177	600377
25	Maanshan Iron & Steel	323	600808
26	Yanzhou Coal Mining	1171	600188
27	Industrial and Commercial Bank of China	1398	601398
28	Tsingtao Brewery	168	600600
29	Shenzhen Expressway	548	600548
30	Anhui Conch Cement	914	600585
31	Huadian Power International Corp	1071	600027
32	China Shipping Development	1138	600026
33	Anhui Expressway	995	600012
34	Angang Steel	347	000898
35	Huaneng Power International	902	600011
36	China Merchants Bank Co. Ltd.	3968	600036

Table 2 – The 36 selected companies commonly listed in both markets

dependent variable PREM represents the price disparity of stock i, defined as the price premium of stock i in the market of A-shares over the same stock in the market of H-shares at time t. LQ, SP, RK, INF, and MC denote respectively the five popular factors identified in previous studies, namely, liquidity, supply, risk, information asymmetry, and market conditions of the two markets (all in relative terms). To take into account the indirect impact of the macroeconomic imbalance, we introduce into the model three other variables CUR, M2, and TR, which denote the 3-month

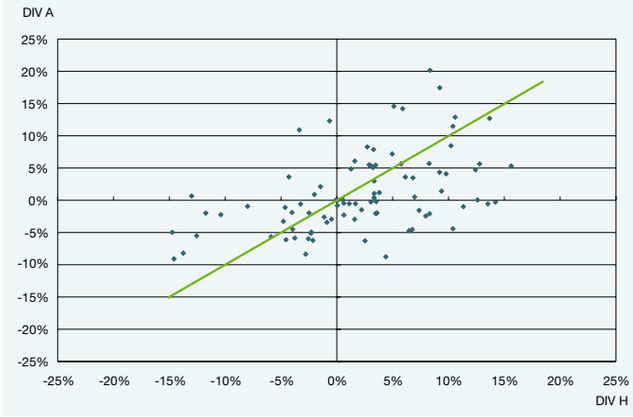

Figure 2 – Scatter plot of Divisia indices (monthly)

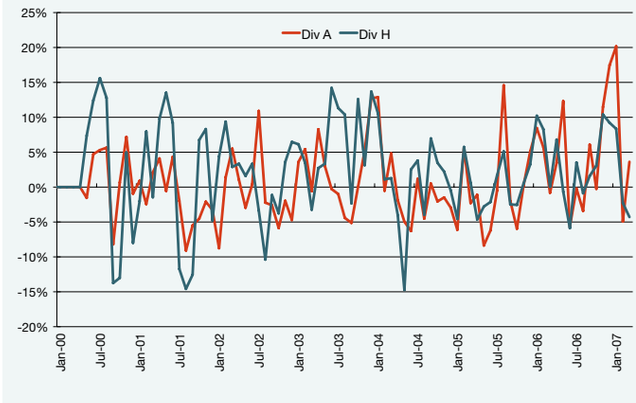

Figure 3 – Divisia indices (monthly)

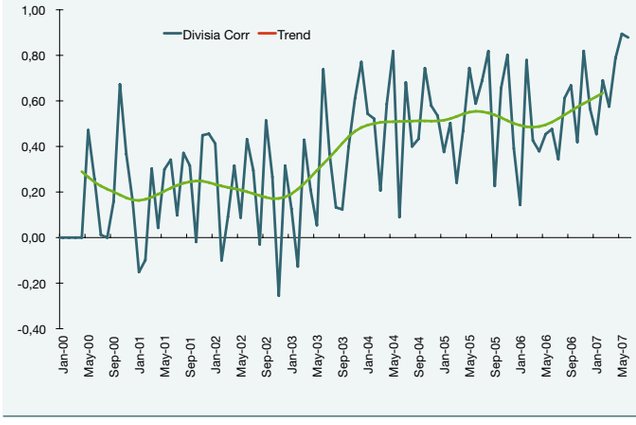

Figure 4 – Divisia correlations (monthly)

Variable	Type of Variable / Factor	Description	Expected effect
$PREM_t$	Dependent variable	Natural logarithm of A-share price minus natural logarithm of H-share price of the same stock	
LQ	Liquidity	Monthly trading volume to the total number of shares outstanding in the A-share market over monthly trading volume to the total number of shares outstanding in the H-share market (in natural logarithm)	+
SP(1)	Supply (1)	Natural logarithm of number of free-floating shares in the A-share market over number of free-floating shares in the H-share market	-
SP(2)	Supply (2)	Natural logarithm of number of outstanding shares in the A-share market over number of outstanding shares in the H-share market	-
RK	Risk level	Natural logarithm of 30-day annualized standard deviation of A-shares over 30-day annualized standard deviation of H-shares	+
INF(1)	Information asymmetry (1)	Natural logarithm of total market capitalization based on all free-floating shares listed in the A-share and H-share markets	-
INF(2)	Information asymmetry (2)	Natural logarithm of total market capitalization based on all outstanding shares listed in the A-share and H-share markets	-
MC	Market conditions	Natural logarithm of Shanghai Stock Index over Hang Seng Index	+
CUR	Rate of renminbi appreciation	Natural logarithm of 3-month nondeliverable forward contract of renminbi over its lag	-
M2	Growth of China's money supply	Natural logarithm of China's money supply (M2) over its lag	+
TR	Trade balance	Natural logarithm of total export over total import in China	-
$PREM_{t-1}$	Lagged term	The price premium in the previous month	+

Table 3 – Description of the dependent variable and explanatory variables

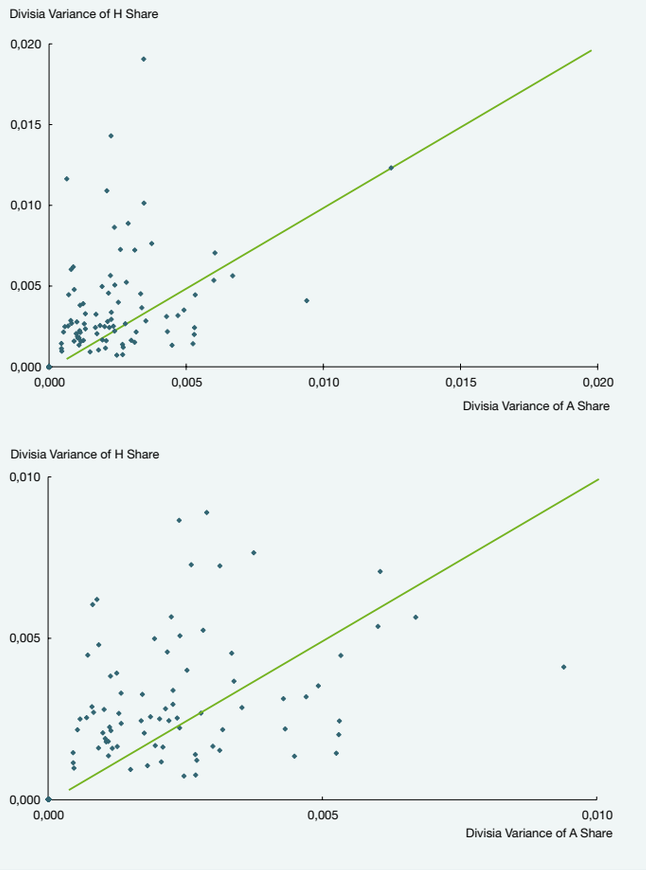

Figure 5 – Scatter plot of Divisia variances

renminbi non-deliverable forward (NDF) rate, money supply M2 of the mainland, and the trade balance of the mainland respectively.[8]

The lagged price premium is included to reflect the trend of the price premium and filter out the autocorrelation [Domowitz et al. (1997)].[9] The coefficient vector $\alpha = (\alpha_0, \alpha_1, \ldots, \alpha_9)'$ is fixed over time and across stocks by assumption.[10] The variables η_i are the individual effects capturing the unobserved idiosyncratic features of stock i and the variables ε_{it} are the disturbances.

Table 3 provides the data details of each explanatory variable used in the estimation. For each stock, the price premium PREM is measured by the logarithmic value of the average monthly A-share price P_A minus that of the average monthly H-share price, i.e., $PREM = \log(P_A) - \log(P_H)$.[11] The liquidity factor LQ is proxied by the relative turnover rates of the two

8 To avoid the problem of collinearity between levels of money supply of China and renminbi's NDF rate, which are shown to be monotonic increasing, the ratios of the current value over its lag X_t/X_{t-1} (i.e., with the variables in change form instead of level when taking logarithm) are considered in the estimation.

9 The correlation between the lagged dependent variable and the disturbance gives rise to the biased estimation of coefficients under ordinary least squares estimation. We employ a generalized method of moment (GMM) estimator to correct the standard errors for heteroskedastickity of unknown form in the time-varying error components and to permit efficient estimation.

10 A random effect model, which allows the individual specific effect to change over time, may provide a better explanatory power for the price premium over the fixed effect model. However, the Hausman test suggests that there is no significant difference between the two model specifications. Moreover, the number of parameters increases sharply when the random effect model is considered, which is especially unfavourable for the scarcity of data on the time dimension. In view of this, the fixed effect model is chosen.

11 All A-share prices originally denominated in renminbi are converted to Hong Kong dollar.

markets, where the turnover rate is defined as the monthly trading volume to the total number of shares outstanding in the markets.[12,13] To reflect the relative supply of the two markets, two proxies, namely, (i) the ratio of the number of free-floating A-shares to the number of H-shares (denoted by SP(1)) and (ii) the ratio of the number of outstanding A-shares to the number of outstanding H-shares (denoted by SP(2)), are considered.[14] The ratio of the variances of returns is used to reflect the relative risk levels RK.[15] Information asymmetry is proxied by the relative market capitalization of free-floating shares (denoted by INF(1)) and that of total outstanding shares (denoted INF(2)) of the two markets.[16] Some descriptive statistics of the variables are presented in Tables A1 and A2 in the Appendix.

Empirical results

Equation (1) is estimated by the generalized method of moments (GMM) so that it can avoid any bias when variables are endogenous.[17] Two regression models, models A and B, are estimated. Model A is (1) using SP(1) and INF(1) as the supply and information asymmetry variables respectively and is estimated for the period from October 2005 to February 2007.[18] Model B is the same as model A except that SP(2) and INF(2) are used as the supply and information asymmetry variables respectively. Given that more data are available for SP(2) and INF(2), model B is estimated for a longer period from April 2000 to February 2007. Both models have their advantages because model A contains variables that are arguably more able to capture the effects of supply and information asymmetry, while model B covers a longer period.

Variable	Model A Oct 2005 – Feb 2007 Coefficient	Model B Apr 2000 – Feb 2007 Coefficient
LQ	0.0417[a]	0.0322[a]
SP(1)	-0.0779[b]	
SP(2)		-0.2081[a]
RK	0.0300[b]	0.0051
INF(1)	-0.1227[a]	
INF(2)		0.0728[c]
MC	0.3300[a]	0.3478[a]
CUR	-4.8083[a]	-1.8233[a]
M2	0.7166[a]	0.5178[a]
TR	-0.0164	-0.0008
$PREM_{(t-1)}$	0.1911[a]	0.2931[a]
Portmanteau test statistics Q(6) for all stocks [2, 3]	4.9, 4.5, 5.7, 5.0, 12.0, 1.5, 7.0, 3.8, 10.5, 4.3, 6.2, 7.2, 4.6, 3.9, 4.4, 4.8, (X), 4.0, 1.8, 6.4, 7.1, (X), 2.8, 2.4, 5.7, 5.9, 2.0, 3.2, 2.1, 7.5, 11.8, 7.9, 4.2, 4.5, 6.5, 2.5.	4.6, 5.2, 8.9, 5.1,10.6, 1.2, 4.4, 2.4, 9.3, 9.8, 9.9, 12.2, 1.9, 12.4, 3.3, 10.3, (X), 16.6, 5.9, 2.1, 6.2, (X), 5.3, 8.7, 4.9, 7.9, 2.0, 2.2, 2.2, 8.2, 7.0, 2.7, 2.5, 18.5, 9.5, 3.7.
No. of stocks	36	36
No. of obs.	482	2039

Notes:
1. a, b, and c denote significance at the 1 percent, 5 percent and 10 percent levels respectively.
2. The Portmanteau test, Q(K), checks whether residuals of each firm are jointly zero correlated up to lag K. At 0.05 and 0.01 level of significance, the critical values are 12.6 and 16.8 respectively. Their corresponding stocks (tickers) are: 1108, 553, 42, 719, 1033, 588, 187, 350, 670, 1065, 874, 338, 358, 1055, 317, 386, 525, 300, 1072, 753, 3988, 991, 763, 177, 323, 1171, 1398, 168, 548, 914, 1071, 1138, 995, 347, 902, 3968.
3. (X) denotes that the corresponding stocks are deleted due to missing information in the final estimation.

Table 4 – Determinants of price premium: GMM estimates

The estimation results are reported in Table 4. The Portmanteau test statistics show that the residuals of the two models have insignificant serial correlation, suggesting that both models are adequately fitted.[19] The coefficients have same signs in both models, except that information asymmetry in model B is found to be different from that in model A. Our key findings for each variable are discussed below.

On the five popular factors identified from the literature

- The price premium is positively related to the relative liquidity of A-shares over H-shares (LQ). This finding suggests that a more liquid A-share (H-share) market tends to increase (reduce) the price premium and vice versa. This is consistent with the theoretical prediction – that investors tend to demand a smaller (larger) compensation for

12 Such measures are commonly used in the literature and they are more powerful in explaining price discounts than others in empirical analysis [see Ma (1996), Domowitz et al. (1997), and Wang and Li (2003)]. The bid-ask spread is also a natural proxy of liquidity [Guo and Tang (2006)]. However, Amihud and Mendelson (1986) found that asset returns are an increasing and concave function of the spread. Consequently, some nonlinear properties should be imposed in the model when the bid-ask spread is used in the estimation.

13 A joint cross-correlation test is considered to examine the lead-lag relationship between the price premium and the turnover rate (i.e., the proxy of liquidity ratio). The joint cross-correlation test shows that the price premium leads the turnover rate significantly, while the turnover rate does not lead the price premium significantly. These results suggest that the issue of reverse causality (i.e., turnover rate leading price premium) is not significant in the analysis.

14 The free-floating H-shares is defined as the number of shares that are available to the public, while the free floating A-shares is defined as the number of current shares outstanding that are tradable or listed on the stock exchange.

15 They are the 30-day price volatility which equals the annualized standard deviation of relative price change of the 30 most recent trading days' closing price. The volatility is the standard deviations of day-to-day logarithmic price changes.

16 Since larger firms have more information disclosure, the firm size proxied by the market value of total outstanding shares may reflect the availability of information. Chan and Kwok (2005) commented that the market capitalization of total shares outstanding may also be a good indicator of the availability of information on the firm. However, their estimation results suggested that the market capitalization of free-floating shares is a better indicator to reflect such factor.

17 In the estimation, we transform equation (1) into first differences with the "white period GMM weight," which provides correct estimates of the coefficient covariances in the presence of heteroskedasticity of unknown form.

18 Such information is only available since October 2005.

19 All residuals of model A have insignificant correlations at a 0.05 level of significance. In model B, all but two firms' residuals have insignificant correlations at an 0.05 level of significance. The two firms are found to have significant correlations among residuals because there were some violent fluctuations during early 2000. As the majority of the firms have already passed the Portmanteau test and the hypotheses for two firms are just marginally rejected, no dummy variable is introduced in the model.

lower (higher) trading cost associated with a more (less) liquid market – as well as the findings in other empirical studies.[20]

- The price premium is found to be negatively associated with the relative supply of A-shares over H-shares (SP) in model A. This result highlights the relative scarcity of A- over H-shares as an important factor in explaining the price premium, reflecting the lack of substitutes for stock investment on the mainland.
- The price premium is positively related to the relative risk ratio (RK) in both models. This result supports the differential risk hypothesis, which postulates that the price premium can be explained by the relative riskiness of the assets because the A- and H-share investors have different risk profiles. Market commentaries often suggest that mainland investors are more speculative (having a higher risk appetite or being less risk averse) and hence may be more willing to pay a higher price for an asset with the same level of risk. On the other hand, Hong Kong and international investors tend to be relatively more risk-averse. Our estimation finds the price premium to be larger for stocks with higher price volatilities in their A-shares than in their H-shares.
- Our results provide some but limited support for the information asymmetry (INF) hypothesis. This hypothesis states that price disparity can be explained by information asymmetry, which can be caused by factors such as availability of reliable information, speed of information flows, language barriers, and different accounting standards. Information asymmetry may result in certain group of investors being disadvantaged and thus less willing to pay. Many studies in the literature employ firm size as a proxy for asymmetric information because larger firms tend to have better information disclosure and attract more analysts to study their stocks. In model A, the results for the more recent period show that larger firms tend to have lower price disparities. However, model B yields an opposite outcome. This may suggest that information asymmetry has become a relevant factor only recently, possibly attributable to the listing of some very large firms during 2006.
- Market conditions (MC) is found to be positively significant in both models. The stock market indices of the mainland and Hong Kong are used as proxies for market conditions, to capture the effects of both market sentiment and general economic conditions, which in turn can have an impact on corporate performance.[21]

On the effects of the macroeconomic imbalance

- Renminbi revaluation or appreciation (CUR) has a negative relationship with the price premium. Appreciation or expected appreciation of the renminbi increases the value of renminbi-denominated assets in U.S. dollars. Given current capital controls of the mainland, H-shares remain the most direct and convenient way for foreign investors to acquire mainland or renminbi-income-generated assets. Consequently, H-share prices should reflect the effect of renminbi appreciation on the firm's future earnings. The results suggest that an appreciation or expected appreciation of the currency induces H-share purchases, thus squeezing the price premium.[22]
- Money supply (M2) is found to be positively related to the price premium.[23] As the macroeconomic imbalance grows, money supply grows. The range of financial products available for investment or savings is, however, very limited on the mainland. With deposit rates kept very low for a long time, stocks have become an increasingly attractive investment option. The macroeconomic imbalance has thus indirectly contributed to the demand for local stocks, which have translated into higher A-share prices and large premiums over H-shares. Our results here simply confirm a widely-observed phenomenon.
- The trade balance (TR) is estimated to be negative, though the coefficients are insignificant. It is common knowledge that trade flows are often used to camouflage capital flows in the presence of capital controls. The trade surplus, which can capture the opportunities of mainlanders to keep their foreign exchange earnings outside the country, is used here to proxy the ability of mainland investors to arbitrage the price differentials of dual-listed A-H stocks in the H-share market. As a result, a rising trade surplus has the effect of lifting the price of H-shares, thus reducing the A-share price premium. The insignificant coefficient may, however, suggest that despite the large trade surplus the impact of mainland investors on H-share prices remains limited.
- The coefficient of lagged price premium is estimated to be less than unity, indicating that share price differentials were partially adjusted over the period when other variables are kept constant.

Final remarks

Dual-listed A- and H-shares came into being as soon as the mainland authorities allowed mainland companies to be listed in the Hong Kong stock market in the early 1990s. For more than a decade there has existed a persistent premium of the A-share over the H-share for the same stock. Initially, dual-listed A- and H- shares were mostly small mainland companies, but the last two years saw phenomenal growth of this market segment following the listing of some very large companies. As a result, the A-H share price disparity has attracted increasing attention

20 Chen et al. (2001), Wang and Li (2003), and Chan and Kwok (2005) find positive relationships between A-share price premium and relative trading volume/turnover rates of A- over H-shares. The results of Guo and Tang (2006) show a negative relationship between A-share price premium and the relative bid-ask spread of A-H shares – more liquid markets tend to have narrower spreads.

21 Based on historical data, the pairwise correlation between the changes in the H-share prices and the changes in the Hang Sang Index is 0.15, while that between the changes in the H-share prices and the changes in the Shanghai Stock Index is 0.21. These figures suggest that both markets' investment environment may somewhat affect the H-share prices. Better Hong Kong stock market conditions may stimulate market sentiment and provide more incentives for investors to buy discounted H-share stocks so that the price premium will narrow.

22 Note that the A-shares can only be traded by mainland investors.

23 Bank deposits, including demand deposits, time deposits, and saving deposits, were also considered in the initial estimations. All results were of similar flavor.

and debates, not only among financial market participants, but also in policy circles.

This paper has examined the relevance of five micro factors identified from the literature to explain stock price disparity in determining the A-H share price premium. Consistent with most previous studies on the overseas emerging markets and the Chinese markets, our findings suggest that four of the five micro factors – namely, market liquidity, shares supply, risk level, and market conditions – are important determinants of the premium. We have also studied the impact of the growing imbalance of the mainland macroeconomy on the A-H share premium. Our results show that macroeconomic factors (renminbi appreciation expectations and monetary expansion) contributed to the A-H share price disparity through affecting the prices of A-shares, but their influence on the prices of the H-shares was insignificant. This finding is consistent with the earlier observation that the A-shares have a smaller Divisia variance than do the H-shares. Consequently, the common forces behind the implied more synchronized A-share price movements can possibly be attributed to these macroeconomic factors.[24]

On policy implications, the fact that the micro factors are found to be important determinants of the price premium implies that there exists significant room for improvements in price discovery and market efficiency. For example, the A-share market liquidity, which averaged about only 40% of the H-share market liquidity in the period from April 2000 to February 2007, is bound to increase – thereby lowering the transaction cost – if arbitrage or participation by investors from the H-share market is permitted or relaxed. The finding that the macro factors are also found to have contributed to the price disparity suggests that any such mechanism or reform would be instrumental in alleviating the pressure on financial markets arising from the macroeconomic imbalance of the mainland, making them less vulnerable to economic shocks.

Nonetheless, it is imperative to note that a mechanism or reform that allows investors of both or either of the markets to arbitrage the disparity will tend to equalize prices. This, in turn, means that a process of risk sharing will necessarily take place between the two markets. To the H-share investor, therefore, the benefit is likely to come at the expense of greater market volatility, at least initially. Over the long term, however, a well-structured mechanism would probably be able to pull in additional liquidity and, ceteris paribus, a deeper overall market should be more conducive to financial stability.

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24 Note that this is not inconsistent with the finding of Miao and Peng (2007) that macroeconomic conditions are not significant factors explaining the relatively high volatility of the mainland market. The Divisia variance measures the relative price changes, while volatility is a measure of absolute price changes. Theoretically, there can be extremely high volatility of share prices, but if these changes are of similar proportions, the resulting Divisia variance would remain small.

Appendix

	Mean	Median	Maximum	Minimum	Std. Dev.
PREM	1.6314	1.3090	5.2733	0.7702	0.7936
LQ (A-shares)	0.0062	0.0049	0.0421	0.0002	0.0056
LQ (H-shares)	0.0089	0.0069	0.1000	0.0003	0.0087
SP (1) (A-shares in mln)	541.8	217.8	7183.3	50.0	941.8
SP (1) (H-shares in mln)	2363.0	747.4	65553.4	62.1	7613.7
SP (2) (A-shares in mln)	8207.8	1433.2	250962.3	208.1	29879.8
SP (2) (H-shares in mln)	2920.8	747.5	83056.5	75.1	10954.1
Risk (A-shares, %)	41.3	38.6	172.9	15.3	15.3
Risk (H-shares, %)	40.1	36.9	150.6	0.0	16.1
INFO (1) (A-shares in HKD mln)	3581.0	1504.3	80663.8	124.4	7881.4
INFO (1) (H-shares in HKD mln)	10632.0	2806.3	309070.6	78.4	32404.8
INFO (2) (A-shares in HKD mln)	42833.4	8187.3	1395231.0	629.8	144623.1
INFO (2) (H-shares in HKD mln)	12906.8	2929.7	391593.3	78.4	44465.3
Shanghai Stock Index	1795.0	1689.4	3000.9	1157.8	575.3
Hang Seng Index	17144.1	16661.3	20106.4	14386.4	1811.6
Rate of renminbi appreciation (%)	1.0030	1.0023	1.0088	0.9979	0.0026
Growth of China's money supply (%)	1.0139	1.0143	1.0273	1.0005	0.0079
Trade balance[b]	1.2290	1.2163	1.4072	1.0469	0.0845

Notes:
a All figures are not log-transformed in the table
b It is the ratio of export over import

Table A1 – General features of the data[a] (sample period: Oct 2005 – Feb 2007; number of firms: 36; number of observations: 482)

	Mean	Median	Maximum	Minimum	Std. Dev.
PREM	3.7200	2.6771	26.9855	0.7702	3.6536
LQ (A-shares)	0.0036	0.0022	0.0421	0.0000	0.0041
LQ (H-shares)	0.0095	0.0067	0.1126	0.0002	0.0097
SP (2) (A-shares in mln)	4989.8	990.5	250962.3	208.1	18263.8
SP (2) (H-shares in mln)	1699.0	433.2	83056.5	75.1	6045.5
Risk (A-shares, %)	36.8	34.9	172.9	10.2	13.6
Risk (H-shares, %)	47.6	43.1	168.0	0.0	21.6
INFO (2) (A-shares in HKD mln)	24411.2	6970.4	1395231.0	513.2	83050.9
INFO (2) (H-shares in HKD mln)	5577.9	1357.7	391593.3	30.0	23434.2
Shanghai Stock Index	1675.0	1612.3	3000.9	1095.4	392.0
Hang Seng Index	13537.0	13516.9	20106.4	8634.5	2910.9
Rate of renminbi appreciation (%)	1.0010	1.0005	1.0088	0.9938	0.0030
Growth of China's money supply (%)	1.0128	1.0130	1.0296	0.9979	0.0080
Trade balance[b]	1.1253	1.1139	1.4072	0.8127	0.0967

Notes:
a All figures are not log-transformed in the table
b It is the ratio of export over import

Table A2 – General features of the data[a] (sample period: Apr 2000 – Feb 2007; number of firms: 36; number of observations: 2039)

PART 1

How Might Cell Phone Money Change the Financial System?

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Abstract

The emergence of cloud banking in developing economies from billions of cell phones transacting both legal tender and informal units of accounts has created a need to reconsider habits of thinking about the nature of money and banking in advanced societies. The dysfunctional nature of modern money and banking is revealed by considering cell phone units of account based on four historical forms of money: (i) the current form of synthetic or "fiat" legal tender that can earn interest, (ii) fiat money that does not earn interest but has a usage fee, (iii) "free-money" issued privately with a usage fee, and (iv) "natural" money redeemable into specified goods and/or services with a usage fee. The value of a "green" form of natural money, redeemable into units of renewable electricity, becomes fixed by the investment cost of generators to create an inflation resistant unit of account. This paper identifies green dollars as offering a competitive medium of exchange for the "invisible hands" of (i) investors, (ii) Islamic economies and businesses, (iii) green voters, (iv) governments seeking to reduce the need for carbon taxing or trading, and (v) those seeking a reserve currency in case the financial system fails.

The purpose of this paper is to consider how the emergence of cell phone money in developing economies may change the financial system in advanced economies.

At the end of 2009 there were 4.6 billion cell phone subscribers in a world of 6.7 billion people.[1] Around two thirds of cell phones are in developing countries poorly serviced by landlines and banks. Handsets costing U.S.$13 [The Economist (2009b)] are now produced with transmission time stored in their "subscriber identity module" (SIM). These phones possess the facility of sending part of their prepaid stored transmission time to other cell phones and/or to replenish their stored transmission time from sources of credit on the Internet via the cell phone network provider. In this way cell phone transmission time has become a unit of account in many developing countries that a village store will redeem into goods [The Economist (2009b)].

Transmission time is metered by phone network operators who keep track, store, and/or create airtime credits on their computers in same way banks keep track and store and/or create credits of legal tender on their computers. In this way, cell phones introduce "cloud" banking with units of value stored on any computer in the world used by the cell phone network operator and/or by an "Internet service provider" (ISP) accessed by a cell phone subscriber.

The dysfunctional nature of modern money and banking is revealed by considering cell phone units of account based on four historical forms of money: (i) the current form of synthetic or "fiat" money as decreed by governments to be legal tender that can earn interest, (ii) fiat money that does not earn interest but has a usage fee, (iii) "free-money" issued privately with a usage fee, and (iv) "natural" money redeemable into specified goods and/or services with a usage fee. Usage fees with natural money limits its life and so are described as "ecological" [Turnbull (2008a, b); (2009b)]. An ecological form of natural money whose unit of value is determined by kilo-watt-hours (kWh) of renewable electricity is described as "green" money. The value of a green form of natural money, redeemable into units of renewable electricity, becomes fixed by the investment cost of generators that may last 25 years or more to create an inflation resistant unit of account. This paper identifies green money as offering a competitive medium of exchange for the "invisible hands" of (i) investors, (ii) Islamic economies and businesses, (iii) green voters, (iv) governments seeking to reduce the need for carbon taxing or trading, and (v) those seeking a reserve currency in case the financial system fails.

Cell phones with e-money represent a disruptive technology. Before Mervyn King accepted the position of Governor of the Bank of England in 2003 he raised the possibility with others [White (2001)] that e-money could result in central banks being replaced by "free banking" and/or decentralized banking [Dowd (1992), King (1999)]. Decentralized banking would introduce profound changes in the power of governments, businesses, and the nature of democracy.

Money creates power. So those who seek to exercise power have sought to control the production and management of what can be used as money. Over thousands of years, rulers, dictators, churches, popes, sovereigns, and bankers have involved themselves in the creation and/or control of money. History records many alliances between the self-interests of bankers, rulers, and religious leaders [Davies (2002), Galbraith (1976), White (1993)]. While the development and spread of democracy has reversed historical practices in exercising power, the development of decentralized banking controlled by the people for the people has yet to be reintroduced. The democratization of global communications through the Internet with cell phones transacting e-money has now created a technology for democratizing economic power in a way democracy has for political power.

Since 2008 a number of governments in developing countries have allowed cell phones to store and distribute their legal tender. The central banks in both the Philippines[2] and Bahrain[3] have approved domestic and international transfers directly between cell phones without the need for settlement having to be cleared through their respective banking systems. This step towards a system of decentralized banking from e-money was anticipated by King (1999) who stated, "There is no reason, in principle, why final settlements could not be carried out by the private sector without the need for clearing through the central bank."

In developing countries, cell phones are available that can be used as "swipe" cards to purchase goods and services in the same way debit cards are used today. Competing cell phone companies in developed countries are seeking permission to follow this example. Once the electronic infrastructure has been established, only trivial technical changes are required to introduce privately issued and controlled currencies like fly-buy points or other units of account. In this way, communities around the world are obtaining the facility for introducing competing units of account based on whatever the local community finds convenient to be used. The chosen unit of account may or may not also carry out the other two traditional roles of money to be a store of value and a medium of exchange.

1 http://reviews.cnet.com/8301-13970_7-10454065-78.html
2 http://www.nextbillion.net/remittances-mobile-globe-cash
3 http://wirelessfederation.com/news/zain-bahrain-launches-zain-wallet-bahrain/

Evolution of money and banking

This section describes how the nature of money and banking has radically changed over recent times to introduce inherent flaws in the ability of the financial system to allocate resources efficiently, equitable, democratically, or on a sustainable basis.

For thousands of years the only type of money in the world was "natural" [Smith (2009)] money based on real things. As reported by Suhr (1989), "In Ptolomean Egypt, peasants delivered their grain to public storehouses and received certificates of deposit." The deposit notes were typically scratched on sherds of pottery and represented a negotiable property right to a specified amount of grain. In this way deposit notes took on the role of money as a store of value and medium of exchange with the quality and quantity of grain being the unit of value. However, at redemption of the deposit note into grain, a storage and maintenance fee was deducted and in some cases also a tax.

Instead of sherds of pottery, paper deposit notes acting as IOUs were issued by goldsmiths and bankers in the Middle Ages to clients who deposited gold with them for safe keeping. Depositors paid a storage fee, rent, or demurrage charge that acted like a negative interest rate. The deposit notes represented a title deed to the ownership of a specified amount of gold, silver, copper, or later on in the American colonies, tobacco [Galbraith (1976)]. The notes could be used as money but it was money that incurred a fee for its use as in Ptolomean Egypt.

The greed and opportunism of early bankers resulted into practices that today would be both unethical and illegal if carried out by a non-banker. Bankers would accept a deposit of gold to obtain a fee for its safekeeping and issue a deposit note payable to the bearer of the note. The note would circulate as hand-to-hand money as the holder held a property right to a specified amount of gold at the bank. The banker would then create a duplicate deposit note for the same gold to lend to a borrower to earn interest!

By this means the banker had created two property rights to the same unit of "hard," "specie," or "base" money. This duplicity illustrates how banks create money out of nothing even when paper money is redeemable into a natural commodity. If a borrower required specie currency, then the banker became an embezzler when they physically lent out the hard currency deposited with them for safekeeping by a client. The more loans a bank made, the more interest and profits it made, so there was a compelling incentive for banks to print more and more duplicate notes providing property rights to the same unit of specie currency so as to make more loans. As the bank would only hold a small fraction of the specie currency it had promised to pay to all bearers of its notes, the practice was described a "fractional banking." As holding paper notes is more convenient than holding gold bullion or other types of specie currency the practice became accepted. However, it represents a type of Ponzi scheme as only a fraction of the paper money issued could be redeemed into specie money.

When money created by the banking system earns interest it creates another systemic problem from the need to forever create more money to pay the interest liabilities being generated. Debts grow even if the economy does not. It provided one reason for this author to suggest in 1982 that the financial system contained the seeds of its own destruction [Turnbull (1989)]. "The Euro zone's debt crisis" [The Economist (2010)] reveals how the exchange of debts within a region exacerbates the problem when not significantly supported by external credits as China provides to the rest of world.

The Royal Charter given by the King of England in 1694 to private entrepreneurs to establish the Bank of England made legal the duplicity of banks creating money out of nothing. The duplicity provided a way for the King to obtain silver to finance a war against France without taxing his subjects [Galbraith (1976)]. The bank issued shares to investors in exchange for silver that the Bank then lent to the King at interest. The King issued non-interest bearing notes promising to pay back the silver to the bank. The Bank lent these notes signed by the King to borrowers to earn interest. In this way the bank obtained interest from both the King and borrowers for the same unit of silver. The promissory notes issued by the King then circulated as hand-to-hand money. Other banks were also issuing promissory notes redeemable into silver so when the King wanted to borrow more silver he banned other banks issuing competitive notes around London. As the King later required even more silver he extended the monopoly of the Bank of England to issue his notes to all of England. In this way, Bank of England notes became a national monopoly – a practice copied by most other governments around the world, which explains how legal tender became monopoly money.

However, currency notes typically represent less than 5% of the money supply. Banks making loans create the other 95% or more of the money supply. When banks make loans they simultaneously increase both the liabilities and assets in the banking system. Borrowers provide assets to banks in the form of their promise to pay back the loan that is matched by liabilities of the banking system to provide funds. In this way loans create the deposits for making the loans. Regulators limit the creation of credit by this means so that the total liabilities the banks can create do not exceed a specified multiple of the shareholder's equity. The ratio of equity to total liabilities is described as the capital adequacy ratio. Currently banks are expected to have equity that is not a smaller fraction than around 8% of total liabilities.

A mystery of the banking system is why governments inflict upon themselves the need and cost of borrowing money from bankers when

governments have the power to create their own money and not pay interest? The present practice is systemically indefensible. It means that for religious folk, banking has become the biggest confidence trick in the history of civilization.

A second systemically dysfunctional feature is the ability of money to earn interest at a compounding rate for an unlimited time. Fiat money is a social construct that can be created with negligible cost and not be based on the existence of any productive real resource. It becomes an artificial or synthetic asset yet it is given the ability to grow in value without limit and without any human input through accruing interest. Without checks and balances this feature is incompatible with establishing a stable system.

Proudohn (1840), a contemporary of Karl Marx, argued that money should depreciate over time. He argued that is was not surplus value from production that exploited labor but the unearned value obtained by owners of money through interest payments. Gesell (1916) was inspired by Proudohn and noted that the value of real assets deteriorates overtime. Gesell proposed that money should have usage cost to make investors neutral to owning real assets or money that at that time was redeemable into gold or silver. The ideas of Gesell inspired many communities to introduce various types of cost carrying or demurrage currencies that are considered in the next section.

The creation of money that does not deteriorate in value over time also means that a bias is created against increasing productivity by investing in “the processes by which society expands its power to make nature yield its resources more abundantly” [Moulton (1935)]. All such processes that increase productivity wear out but synthetic interest earning assets do not. So a compelling bias is created for investors to allocate human resources to creating, managing and speculating in synthetic assets and so the growth of the financial system rather than in assets that make society more productive and sustainable. The result is a process described as “financialization” [Palley (2007)] by which the size of the financial system increases as a percentage of gross domestic product (GDP).

The financial system can be thought of as the oil in an automobile engine that may represent less than, say, 1% of its mass but without it, the engine cannot work. However, the overhead cost of the financial system in servicing the real economy as a percentage of GDP continues to grow. Its cost in the U.S. rose from 15.2% in 1979 to 20.4% in 2005 [Palley (2007)].

The payment of interest is also indefensible on grounds of equity as it means the rich who own money can get richer by lending money to the poor who pay interest. It is by this means that the World Bank extracts value from poor nations and transfers their income to the rich economies that fund the Bank. This problem can be avoided with self-financing strategies [Turnbull (2001, 2007)] and/or through Islamic banking that forbids the payment of interest. As confirmed by Keynes (1936), “the rate of interest is purely a monetary phenomenon.”

Interest payments can double or even triple the cost of paying off 25-year loans to finance a house, or self-financing infrastructure facilities like water and sewerage works, toll roads, and airports. In this way interest inflates the prices charged for public services and/or increase the taxes that need to be imposed to pay their interest costs. It is systemically contradictory for governments to impose taxes to pay interest on money created by bankers out of nothing that the government could instead create itself. Credit creation by the government instead of by the banks would reduce any inflationary impact of credit creation as costs are significantly reduced [Kennedy (1989), Huber and Robertson (2000)]. Huber and Robertson showed how such a change could substantial reduce the need for the U.K. or U.S. governments to raise taxes to pay for borrowing costs.

The cost of interest contributes to what Stern (2006) described in his report on the economic effects of climate change as “the biggest market failure the World has ever seen.” It is the higher interest cost of sustainable sources of generating electricity that makes burning carbon more attractive [Turnbull (2008a)]. This situation arises because the investment required by per unit of output of generating electricity from water, wind, sun, geothermal, and other sustainable sources can be three or more times greater than that from power generated from burning carbon.

Another bias in resource allocation arises when diverse economic regions share a common currency, as occurs in the European Union, or in natural resource rich countries like Australia, Brazil, and Canada. Consider a mind experiment that assumes that the consumption of foreign exchange in a region is directly proportional to the population of the region. Let us make two other reasonably realistic assumptions for a country like Australia where 1) 10% of the population live in Western Australia, thus requiring only 10% of Australian foreign exchange, and 2) Western Australians earn around 60% of all Australian foreign exchange through the export of their minerals and primary products. This means that on average each Western Australian is earning six times the foreign exchange they are spending and citizens in the east are earning less than half the foreign exchange they require.

Now if Western Australia established its own currency, then its value would be determined by its terms of trade with the rest of the world. The other 90% of Australians residing in the eastern states are earning only 44% (90%/40%) of the foreign exchange that they require. The result would be a substantial decline in the value of the Australian dollar used in the eastern states to create a boom in inbound tourism, education exports, and manufacturing while the stronger Western Australia currency

would attract migrants from the eastern states and make imports much cheaper. Other larger exporters in the eastern states, mainly coal miners and farmers would demand that their regions establish their own non-urban currency to allow them to survive. The history of "faulty feedback to cities" created by a common regional currency over the last thousand years is documented by Jacobs (1985).

The mind experiment illustrates just how potent the design of a currency system can be. Currencies can create market forces far more influential than tariffs and taxes in allocating resources. It illustrates how imbalances can arise in the European Currency Union. It helps explain the economic success of cities with their own currency like Hong Kong and Singapore. Singapore became a competitive manufacturing center when it became independent of Malaysia in 1965 whose currency was kept high by it being a major rubber and tin exporter.

Another feature that makes modern money systemically indefensible is that it has been cast adrift from the discipline of being defined in terms of any specified goods or services. This occurred in 1972 when the U.S. removed the ability of the U.S. dollar to be redeemed into gold. Money that exists as legal tender only by the force of law is described as "fiat" money. All major currencies are either national monopolies or in the case of the euro, a trans-national monopoly. When the euro was created as not being redeemable into any specific commodity, The Economist (1990) described it as "funny money." Like other fiat currencies it can be rightly described as monopoly funny money.

In summary, some of the major systemic indefensible features of the existing monetary regime identified in this section are:

(i) Money is a social construct not definable in terms of anything real.
(ii) There is no basis for interest to be paid for money that is not saved but created out of nothing.
(iii) Prices of real resources are determined without sensitive feedback signals from the environment.
(iv) There is no global unit of value for real resources to be allocated by market forces on a sustainable basis.
(v) There is no inflation resisting global unit of account.
(vi) There may be little basis for resources to be efficiently allocated in diversified economies that share a common currency.
(vii) Governments have delegated to banks the power to create over 95% of money that is a public good to further the profits of private banks.
(viii) Governments raise taxes to pay interest on borrowed money that governments could create themselves to eliminate the need to raise taxes to pay interest.
(ix) More money and credit needs to be continually created to fund the interest payments to private banks generated from their earlier expansion of credit.
(x) The use of money that generates interest charges rather than a carrying costs creates:
  (a) A systematic bias for inequality in wealth with the owners of money increasing their income without human inputs.
  (b) A compelling incentive for the cost of the financial system to grow relative to the costs of the whole economy.
  (c) A substantial bias to burn carbon to generate electricity rather than using investment intensive renewable resources.
  (d) A disincentive to own real assets that deteriorate or incur costs to maintain and/or improve the quality and sustainability of life.
  (e) The need for investment analysis to discount the future value of money and so the ability of humanity to have a sustainable future.
  (f) No basis to justify the reliance on market forces to sustain the existence of humanity on the planet.

The following section considers alternative forms of money that in various degrees overcome the above systemic indefensible features of the existing monetary regime.

Historical examples of cost carrying natural money

This section reviews three forms of cost carrying money introduced or proposed during the Great Depression to supplement official money. At that time official money in Europe had been an unreliable unit of value and in the U.S. it was in short supply.

The different types of money considered for an e-currency to follow are: (i) privately issued money with a usage fee whose value is based on official money, (ii) government issued money with a usage fee, and (iii) privately issued money with a usage fee redeemable into a specified commodity. All three examples represented natural money, as legal tender at the time was typically redeemable into gold or silver. The concluding next section considers green e-money redeemable into units of kilo-watt-hours (kWh) generated from renewable energy sources.

Mainstream economic analysis has neglected[4] the rapid and widespread emergence during the Great Depression in Europe and the U.S. of privately issued "free-money" [Gesell (1916)]. In considering how free markets might organize money, Selgin and White (1994) did not consider money arising without an interest rate as it has in past eras and also during the Great Depression when cost carrying notes emerged. The notes very successfully competed with official money even though they lost all their value if a fee was not periodically incurred [Fisher (1933)].

4 The literature review of free banking (White 1993, volume I: pp xvii-xxii) does not cite Fisher, Gesell, Keynes, Suhr, or any other writers on the theory or practice of cost carrying money.

To answer their question of "How would the invisible hand handle money?", Selgin and White (1994) restricted their invisible hand to only creating three sorts of money: (i) natural money based on a single commodity, (ii) multiple commodity money, and (iii) "no base money" or fiat money. In addition, their analysis implied that any commodity backing a currency would be traditional hard commodities rather than a service of nature like electricity generated from renewable sources.

The monetary regimes considered in this paper introduce two elements mostly neglected in the literature of: (i) cost carrying money and (ii) money defined in terms of a service of nature that is required to sustain life. Today, energy has become a basic necessity to sustain life as grain was three thousand years ago. Energy has the advantage that it can be objectively measured to provide a universal unit of account. However, the value of each unit could vary from region to region according to its endowment of renewable energy.

One explanation of why cost-carrying money has been neglected by economists is that they may find it difficult to envisage why anybody would accept a form of money that incurred a cost and so could not be used as a long-term store of value. However, as noted above, this type of money had been in use for thousands of years. The point that cost-carrying money does not provide a store value turns out to be an advantage. It simplifies the role of money to just being a unit of value to mediate exchange transactions of other goods and services.

The reasons why and how cost-carrying money was introduced in the Great Depression and quickly spread was documented by leading monetary scholars of the time like Fisher (1933) and Keynes (1936). It is curious why their writings on "stamp scrip" (Fisher 1933) that Gesell referred to as "free-money" have been overlooked. Especially as contemporary scholars have been considering imposing a cost on international transfers described as a "Tobin Tax" [OECD (2002)].

Gesell proposed that money should incur a cost of 0.1% of its face value per week, equivalent to 5.4% per annum. Keynes (1936) thought that this "would be too high in existing conditions, but the correct figure, which would have to be changed from time to time, could only be reached by trial and error." In practice much higher costs were used. Today the privately issued Chiemgauer currency in Southern Germany is using notes with a cost of 2% per quarter or 8% per year [Gelleri (2009)]. Fisher (1933) and Keynes (1936) supported the introduction of stamped scrip because among other things it could be used to stabilize prices. Keynes referred to Gesell as "unduly neglected prophet." In Chapter 23, part VI of his "General theory" Keynes[5] states that Gesell's 1916 book described, "the establishment of an anti-Marxian socialism" based on "an unfettering of competition instead of its abolition." Onken (2000) described it as "[a] market economy without capitalism."

Keynes (1936) wrote: "The idea behind stamped money is sound" and went on to say: "Those reformers, who look for a remedy by creating artificial carrying cost for money through the device of requiring legal-tender currency to be periodically stamped at a prescribed cost in order to retain its quality as money, have been on the right track, and the practical value of their proposal deserves consideration."

The private issue of cost carrying money in competition with official money was initiated in Germany after the first World War and spread to a number of European countries as documented by Fisher (1933) and Onken (2000). Various levels of cost were introduced from 1% monthly to 2% weekly. However, this type of money spread so quickly and was so successful in reinvigorating local communities in the depth of the Great Depression that it was soon made illegal by governments as it threatened the role of official money and their central banks.

On the reverse side of each currency note issued that incurred a cost there would be spaces for affixing stamps purchased from the issuer of the money to show that payment for the use of the money had been made each week or month as the case may be from the date of issue of the note. In some regions the notes were redeemable into official money and/or the specie currency by which it was backed on the payment of a redemption fee. The redemption fee was made greater than the cost of affixing a new stamp to keep the note valid and so useable. This meant it was cheaper to keep notes alive than to redeem them. In a number of locations the notes were redeemable into specified goods or even a commodity like coal, as used to restart a bankrupt coalmine in the German village of Schwanenkirchen [Fisher (1933)].

Cell phone technology now allows stamps to be replaced by direct credits to the issuer of e-money in a similar manner that debits are directly recorded against the owners of credit or debit cards when they make a purchase. It has only been practical to consider the introduction of cost carrying e-money since the roll out of 3G-cell phone technology around 2004. A type of stamp scrip widely introduced in the U.S. in 1933 were notes requiring a two cent stamp per dollar value to be affixed each week. Various parties such as the local chamber of commerce, city or local government, would issue the notes. Merchants, their local suppliers, and employees would agree to accept the notes that were given away to customers to generate economic activity in the community. Those that did not accept the notes would lose business.[6]

5 Keynes (1936) stated: "I believe that the future will learn more from the spirit of Gesell than from that of Marx."

6 Privately issued IOUs were accepted as money in a similar manner in the then new English colony of Australia during the 18th century before precious metals had been discovered, banks established, or the government had imported a printing press [Butlin (1953)]. Rum also became a popular form of currency.

A widely used form of stamp scrip in the U.S. would lose all its value at midnight each Tuesday unless additional stamps valued at 2% of the face value of the note were affixed to it. The notes were redeemable into official money after one year. By that time the issuer would have sold 52 stamps of two cents each for each one-dollar note on issue. In this way the issuer obtained a profit of 4% of the value of the notes issued as the value of stamps sold for each dollar note would be 52 x $0.02 = $1.04.

Because of the cost of holding stamp scrip, it was used quickly since if you did not use it or stamp it you lost it. Fisher (1933) reports that stamp scrip circulated three or four times faster than official money and for this reason was commonly referred to as "speed money." Gelleri (2009) reports that the Chiemgauer notes circulate at a similar rate of three times faster than the euro even though the carrying cost is substantially less than that reported by Fisher.

The use of cost carrying money would result in merchants needing to pay a usage charge of 2% on the value of the scrip in their tills each Tuesday night. However, a 2% charge once a week is far more attractive than paying 2% or more on every credit card transaction during the week. Ironically cost carry money introduces significant savings for both merchants and the economy as it multiples the productivity of money in mediating transactions by a factor of three.

One of the incentives for governments to introduce or enforce legal tender laws was to suppress the success of private sector initiatives in introducing stamp scrip. Instead of banning such initiatives, governments today could consider introducing it to overcome many of the indefensible dysfunctional attributes of the current money system noted in the previous section.

Fisher (1933) describes how the "pump priming" of the U.S. economy in 1932 by the Federal Reserve failed because its approach "was conceived for the producer, not the consumer." He went on to say "this is precisely where the stamp scrip comes in – to give buying power to the consumer, and supply the compulsion to use it." Fisher also notes that it discourages "the banks from hoarding cash – 'to keep liquid' as they prefer to express it." These very same issues arose again 75 years later with the global financial crisis of 2008. However, after the global financial crisis of 2008 many governments made the same mistake in reinflating modern economies as Fisher described in 1933.

The 2008 crisis triggered a reappraisal of deep-rooted habits of thinking about money by some commentators. The Economist (2009a) asked "Will old-fashioned scrip make a comeback" with George Monboit (2009) of The Guardian writing: "If the state can't save us, we need a licence to print our own money. It bypasses greedy banks. It recharges local economies. It's time to think seriously about an alternative currency."

The magic of cost carrying money is that it pays for itself. The 1933 U.S. version became self-liquidating in one year. Any inflationary pressures that might exist from creating more money in a recession or depression are reversed, as the money is self-canceling. More importantly, governments can stimulate their economies without the need for either going into debt or raising taxes [Turnbull (2009a, b, c)]. The Bankhead-Pettingell Bill introduced in the U.S. Congress on 17 February 1933 would have achieved this result [Fisher (1933)]. The bill is as relevant today to stimulate an economy and/or finance universal healthcare and social security as it was in 1933.

The bill proposed the issue of one trillion dollars of stamp scrip as legal tender requiring a stamp of 2% of the face value of each note to be affixed each week and redeemed for official money after one year. The scrip was to be distributed to each U.S. state in proportion to their population. Half of the scrip was to be given away to each citizen and the other half used by each state to build infrastructure services.

However, 14 days after the bill was introduced, President Roosevelt announced the New Deal on March 4th that temporarily closed all banks and prohibited the issue of all "emergency currencies." In this way the power and influence of the privately owned Federal Reserve System was protected from competition from both private currencies and the U.S. Post Office. The stamps were to be sold by the Post Office who would have also redeemed the scrip to make a gross profit of U.S.$40 billion.

History also reveals that those in control of fiat funny money have protected its monopoly status by banning competing monies, even when the alternative scrip or currencies proved to be highly successful in reinvigorating local economies. Godschalk (2008) states, "real innovations like e-money are still lacking which could be (anonymous) transferable from person to person or new digital 'numeraires' (as a new private currency not nominated in state money units like $ or €)." It is these types of e-money that are considered in the concluding next section.

Implications of e-money

This section considers the implications of a green type of e-money emerging. Over the last ten years numerous scholars have considered the implications on the architecture of the financial system from the introduction of e-money in its existing fiat form [Cronin and Dowd (2001), Dowd (1998), Friedman (2000), Rahn (2000)]. In considering the implications of e-money King (1999) continued the quote, cited above, by saying: "Without such a role in settlements, central banks, in their present form, would no longer exist, nor would money. Financial systems of this kind have been discussed by Black (1970), Fama (1980), Friedman (1999), Hall (1983) and Issing (1999). The need to limit excessive money creation would be replaced by a concern to ensure the integrity of the computer systems used for settlement purposes. A regulatory body to

monitor such systems would be required." "Central banks may be at the peak of their power. There may well be fewer central banks in the future, and their extinction cannot be ruled out. Societies have managed without central banks in the past. They may well do so again in the future."

Gormez and Budd (2003) support the views of King (1999) that e-money will promote a choice in competing private currencies. Hayek (1976a,b) promoted the idea of competing currencies to control inflation. Gormez and Budd concluded, "the impact and effects of e-money are broad-ranging and far reaching." They went on to state that "it will increase the efficiency and productivity of the future monetary and financial systems, whether conducted within existing or revised arrangements."

In considering "revised arrangements," money that can earn interest or that is not redeemable into specified goods or services is not considered as a competitive option for e-money for the reasons identified above. Non-interest earning money in the form of cost-carrying e-money would obtain the support of numerous "invisible hands" of Islamic bankers and traders that could initiate or promote its adoption.

A theoretically attractive form for natural money is one redeemable into a basket of commodities in a ratio that reflects their consumption as included in the analysis by Selgin and White (1994). But patterns of consumption change and are different in different regions. So uncertainty would be introduced from the political processes required in deciding which commodities are included and in what proportions and when and how changes should be made in these parameters.

An analysis of the economic, political, and practical advantages of using kWh over gold and other alternatives are presented in Turnbull (2008b). In practice there could be competing alternative types of private e-money. But worldwide concern over climate change could produce an overwhelming number of invisible hands to support the use of green e-dollars redeemable into kWh produced from renewable energy. The introduction of green money would be especially compelling where it provided an alternative to carbon trading or taxing.

The local value of green dollars would be inflation resisting as the cost of production is largely fixed for the 25 year, or more, life of the generating equipment put in place to convert renewable energy into electricity. The financing of green generators by the issue of pre-payment vouchers to pay for electricity consumed in the future is described in Turnbull (2008b). The vouchers would be redeemable at different dates to pay bills over the life of the green generators to provide an inflation-resisting unit of value. Central banks would no longer be required to maintain the purchasing power of e-money redeemable into pre-payment vouchers. This feature could provide a basis for the most pragmatic invisible hands to prefer green dollars in preference to other types private or official money.

Neither the government nor commercial banks would be required to create credit. Nor would additional green money need to be created to finance the interest cost of creating old money as currently occurs. A sustainable economy becomes feasible [Daly (1977), Kennedy (1989)].

Credit would be provided as it is today by suppliers of goods and services. The existence of a local inflation-resisting green unit of value would provide a numeraire for traders and investors to establish the prices of their transactions. Credit required to bridge the payback period of new investments could be created in a similar manner as used to finance green generators. Alternatively, investment banks could fund new ventures by the issue cost-carrying money that would pay for itself even if the venture failed. Governments could fund public infrastructure projects on a similar basis to eliminate the cost interest. This would reduce the taxes that needed to be raised and/or reduce the price paid by consumers for public services.

The revenues that governments could obtain from that issue cost carrying money are so great that they could be used to fund universal social security and health care. The introduction of green e-money as a supplementary form of legal tender would provide a way to reduce the size and cost of the financial sector of economy and increase the size and cost of the welfare sector. Reversing the process of financialization in this way would make a major contribution to improving economic equity and the quality of life.

A compelling reason for governments to facilitate, if not initiate, the introduction of green e-money is to put in place a supplementary financial system to support, if not replace, the existing dysfunctional system. The excessive debt burden of the richest countries has increased the risk of another systemic failure of the existing system. The existence of private and/or official issued green e-money would provide a systemic economic lifeboat in the event of another financial crisis as well as reducing the need for carbon taxing or trading.

In discussing the economic details for the general introduction of cost-carrying money Suhr (1889) stated, "we can confidently leave most of them to the practitioners who, once they have understood the system, can bring neutral money to life better than monetary theory can." While there could be major differences in the details of how economic institutions might operate the differences would be less in regards to the social, political, and environmental implications.

Decentralized banking introduced by green e-dollars would allow local communities, towns, cities, and governments at local, state, and national levels to become self-financing to liberate them from dependency on alien sources of finance as is often the case [Turnbull (2008a)]. In advanced economies, around a third of household income can be exported

to alien communities by mortgage and/or rent payments. This indicates the substantial contribution internal financing can contribute to the enrichment of local communities.

Communities would no longer be resource rich and finance poor by economic values being drained out to alien sources of finance. There would be no need for the World Bank and other multinational or bilateral financial aid agencies [Turnbull (1986, 2001, 2007, 2008a)]. Agencies may only be required to share the knowledge of how to create and manage community currencies to facilitate self-financing economic activities.

Central banking after all is but a specialized sort of central planning that assumes one set of policy prescriptions are suitable for all regions at the same time. Decentralized banking decentralizes economic, social, and political power to enrich democratic institutions that may otherwise become captive to financial interests. Various ways in which the institutional arrangements could be established are considered in my other writings [Turnbull (1976, 1986; 1992, 2001, 2007)].

Green e-money would remove the ten systemic dysfunctional attributes of the existing financial system listed above. Green e-money would be a global unit of account but whose value would vary according to the local cost of renewable energy. By eliminating the cost of interest green money would remove the bias created by the current financial system against the use of renewable energy.

In a number of developing countries the existence, let alone the state, of the local banking system has become irrelevant to the billions of people using cell phones to transact billions of dollars. There now exist the means for citizens in advanced economies to carry on business if a financial crisis again emerges. This supports the arguments presented above that governments should encourage the spread of e-money.

To sum up, the introduction of an ecological form of e-money in the form of green dollars would: (a) provide a stable unit of local value negating the need for central banks; (b) provide money not used as a store of value; (c) provide improved equity by reducing unearned income; (d) reverse financialization with real assets becoming more attractive; (e) facilitate steady state economies with a global unit of account but not of value; (f) promote sustainability by reducing the relative cost of finance intensive renewable energy in comparison with energy obtained from burning carbon; (g) facilitate community banking; (h) mitigate the social power of money; and (i) enrich democracy. Green e-money provides a basis for establishing a more efficient, equitable, and resilient financial system to service and promote a more efficient, equitable, sustainable, and democratic real economy not dependent upon continued growth.

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PART 1

Technology Simplification and the Industrialization of Investment Banking

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Abstract

Parallels can be drawn between the transformation of the international investment banking industry in the last thirty years and the Industrial Revolution that led to the industrialization of Europe and America in the 18th and 19th centuries. In the Industrial Revolution new sources of power, higher levels of automation, and enhanced transport infrastructures triggered economic and social transformations. In the same way, the increased availability of information, supported by the implementation of computer systems and IT infrastructure, triggered a transformation of business models in investment banks from the 1970s onwards. These parallels between the Industrial Revolution and the "industrialization" of investment banking shed light on the role of information technology as both a trigger and an enabler of the industrialization process, and suggest directions for the future role of IT within the industry.

Industrialization of investment banking

The Industrial Revolution of the 18th and 19th centuries was driven by several key inventions and new technologies. The first of these was ready access to power through technologies such as the water wheel and the recently-invented steam engine. In response to an increased demand for power, the output of coal in the U.K. increased over ten-fold during the 19th century, from 17.7 million tons per year in 1820 to 230 million tons per year in 1900.[1] Secondly, the invention of machinery that could use this newly-available power allowed the automation of manufacturing tasks that were previously manual and labor-intensive. For example, the first water-powered cotton mills were built in the late 18th century and by 1860 there were some 2,650 cotton mills in the U.K.[2] Thirdly, the development of canal and rail networks allowed raw materials to be transported to factories and finished products to be distributed nationwide. The first major canal in the U.K., the Bridgewater Canal, was opened in 1761. By 1830 almost 4,000 kilometers of canals had been developed, almost tripling the length of navigable inland waterways.[3] The growth of the railway network in Britain was even more spectacular: in the 70 years between 1830 and 1900, over 30,000 kilometers of railway were built.

In a similar and parallel way, the international investment banking industry has been transformed in the last thirty years by ready access to information and by the development of IT systems to distribute, capture, and process this information. As Walter Wriston, chief executive of Citicorp for 17 years, said: "Information about money has become almost as important as money itself." This famous remark highlights the fact that information is the life-blood of investment banking. An international investment bank has an unending appetite for external information on markets, prices, exchange rates, interest rates, credit ratings, and yield curves. It generates and stores vast amounts of internal information on clients and counterparties, trades, and transactions. It also produces information in its research departments, and generates revenue by selling and trading on this information. The success of a modern investment bank depends upon it having more timely, more accurate, and more detailed information than its competitors.

In the 1970s, a typical investment bank was a partnership, with a capital base that was limited by the personal wealth of its partners. Most of its revenue came from fees, and its core business was corporate banking, helping a small, tightly-knit community of large corporations to raise funds in domestic and internal capital markets. It established long-term relationships with these corporations, and built up a detailed knowledge of the structures and financial profiles of its main clients. Its success depended on maintaining a reputation for expertise in the workings of capital markets and how they could be accessed, and on the ability to apply this expertise to link its clients with sources of capital.

By the end of the century investment banks looked very different. A typical investment bank at the start of the 21st century was at the heart of a global full-service banking group in public ownership. Proprietary trading, which had been a subsidiary function in traditional investment banks, was now on a par with the corporate banking functions. In many investment banks, trading profits were equaling or exceeding banking profits. Investment banks now dealt with a much larger and more diverse range of counterparties, and a large and increasing proportion of their business had become transactional rather than relational. With a larger capital base came an increased appetite for risk. As a result investment banks took on larger proprietary positions and held them for longer periods.

The role of IT in industrialization

It is no coincidence that this transformation of the investment banking industry occurred at the same time as the widespread introduction of computers and computer systems to the workplace. The launch of NASDAQ, the world's first electronic stock exchange in 1971, started a movement towards on-screen trading in exchange-based securities markets. Electronic trading in securities markets was initially seen as complementary to the traditional on-the-floor trading, providing liquidity for small issues and enabling out-of-hours trading. However, by the end of the 20th century, almost all wholesale trading in securities markets had moved to electronic trading channels. A similar transition occurred in the interbank FX and money markets, following the U.K.'s abolition of foreign exchange controls in 1979. Financial information providers such as Bloomberg and Reuters initially provided on-screen price feeds, and in the 1980s they added electronic trading applications which rapidly replaced phone-based trading. Face-to-face trading on the trading floor of the London Stock Exchange declined rapidly after the Big Bang deregulation of the U.K. equities market in 1986. One of the last surviving open-outcry markets in London was the International Petroleum Exchange, which finally closed its trading pits in 2005.[4]

The advent of electronic trading across all financial markets greatly increased the transparency of those markets. Corporations no longer needed to use investment banks in order to obtain market information, and they could use a variety of channels to access the capital markets. Instead of cultivating a relationship with one or two investment banks, a CFO could now compare competing quotes from many banks at the same time. Increased market transparency made investment banking much more competitive. It also raised the specter of disintermediation, forcing investment banks to face the possibility that their corporate clients might bypass them completely. This motivated investment banks

1 Halsall, P., 1997, Internet modern history sourcebook, Table 3, Fordham University http://www.fordham.edu/halsall/mod/indrevtabs1.html
2 Arnold, R. A., 1864, "The history of the cotton famine, Saunders, Ottley & Co., London
3 Floud, R., and P. A. Johnson, 2004, The Cambridge economic history of modern Britain, Cambridge University Press, Cambridge
4 BBC News Channel, 2005, Open outcry trading to end on IPE, BBC News, 7 April 2005. http://news.bbc.co.uk/1/hi/business/4415905.stm

to move away from their traditional fee-based business models and to adopt a more transactional business model, based on shallower and more ephemeral relationships with a larger number of counterparties.

New markets for new products

One of the impacts of the Industrial Revolution was the creation of new markets for new and cheaper products. A well-known example of this is the impact of industrialization on cotton cloth production. Between 1780 and 1860, automation of all stages in the production process of cotton cloth, from preparation of raw cotton to the weaving of the finished product, led to a reduction in the unit price of finished cloth by a factor of eight. Cotton cloth, which had previously been a luxury, became an affordable item. This price reduction, together with new transport links for distributing goods to consumers, triggered an increase in demand. Over the same period, as its price fell by a factor of eight, the production of cotton cloth in British mills also rose by a factor of eight.[5]

In similar fashion, investment banks in the 1980s responded to the threats to their traditional business by developing and expanding into new markets. One of these new markets, developed initially in the U.S., was the commercial mortgage-backed securities market. Initially trading in the bonds issued by the U.S. government agencies (FNMA, GNMA and FHLMC), investment banks developed expertise in valuing these types of securities. The natural extension of this was for investment banks to buy mortgages directly from savings and loan associations, and then repackage and securitize these loans by issuing their own commercial mortgage-backed securities (CMBS). This allowed the banks to extend their customer base and to profit from their expertise in financial engineering and their ability to value complex financial products. For the savings and loans associations, it gave them access to a funding conduit that was not subject to the restrictions and regulations imposed by the government agencies. Once pioneers such as Goldman Sachs had opened up the CMBS market, it grew at an exponential rate. By 2008 the open value of commercial mortgage-backed securities stood at over U.S.$720 billion, and in its peak year alone (2007) over U.S.$300 billion of new commercial mortgage-backed securities were issued.[6]

Another new market that was a natural extension of investment banks' traditional business was the trading of credit derivatives. A traditional activity for an investment bank was the underwriting of a new bonds issue by one of its corporate clients. In underwriting, a bank buys some or all of a bond issue at a guaranteed price, and then sells the bonds on to third-party investors. Successful underwriting depends on the bank's ability to correctly price the bond issue – if the bank sets its guaranteed price too high then it loses money on the underwriting; if it sets the price too low then its client will go elsewhere to raise capital. Accurate pricing in turn depends on an ability to assess the credit risk of the issuer, which determines the credit spread at which its bonds will trade. This experience with assessment and pricing of credit risk meant that investment banks were natural players in the new credit derivatives markets that developed in the 1980s and 1990s.

In the new and emerging derivatives markets, IT acted as an enabler as well as a driver. Quantitative models for pricing derivatives started with the creation of the Black-Scholes option pricing algorithm in 1973. As more and more computer power became available on traders' desktops, they were able to run sophisticated pricing algorithms and quote prices for an increasingly complex and diverse range of derivative products. For example, mortgage-backed securities were bought and re-packaged by investment banks into derivative products called collateralized debt obligations or CDOs. The first CDO was issued by Drexel Burnham Lambert in 1987, but initially the complexities of these products made them difficult to value. In 2000, financial analyst David Li published a paper in the Journal of Fixed Income which proposed a method of valuing CDOs based on a statistical distribution called a Gaussian copula.[7] This method was widely adopted by investment banks and became the de facto standard for valuing CDOs. As a result, the market in CDOs boomed. New issues of CDOs in 2000 stood at U.S.$68 million; in 2006, the peak year for CDO issuance, the value of new CDOs issued was over U.S.$520 billion.[8]

New rules for new materials

The parallel to financial product innovation in the Industrial Revolution was the invention of new building materials and methods of construction. One of these new materials was cast iron. The first major structural use of cast iron was in the construction of the Iron Bridge at Ironbridge Gorge in Shropshire, built by Abraham Darby in the 1770s. The material was then used extensively to construct aqueducts which carried canals over natural obstacles and avoided the need for time-consuming staircases of locks. Cast iron aqueducts such as the Chirk aqueduct and the Pontcysyllte aqueduct are still standing today.

In the 19th century the rapidly expanding railway network needed a cheap and durable material to construct bridges across valleys and rivers. Following its successful use in canal aqueducts, cast iron seemed a natural choice for railway bridges. However, a railway bridge is subject to a variable load when a train passes over it, whereas the load on an aqueduct is steady and constant. Cast iron is strong in compression but

5 Floud, R., and D. McCloskey, 1981, The economic history of Britain since 1700, Cambridge University Press, Cambridge

6 Commercial Mortgage Securities Association, 2010, Compendium of Statistics, CMSA http://www.cmsaglobal.org/uploadedFiles/CMSA_Site_Home/Industry_Resources/Research/Industry_Statistics/CMSA_Compendium.pdf

7 Li, D. X., 2000, "On default correlation: a copula function approach," Journal of Fixed Income, 9, 43–54

8 Securities Industry and Financial Markets Association, 2010, Global CDO Issuance 2000-2009, SIFMA http://www.sifma.org/uploadedFiles/Research/Statistics/SIFMA_GlobalCDOData.pdf

weak in tension, and variable loads lead to stress concentrations around natural flaws produced in the casting process, which gives rise to crack propagation and eventually catastrophic failure. Unfortunately, 19th century engineers did not appreciate these factors, and assumed that their experience with building aqueducts could be carried over unchanged into the construction of railway bridges. Cast iron was used to construct larger and larger railway bridges, including the three and a half kilometer long Tay Rail Bridge spanning the Firth of Tay. When it was opened in 1878, this was the longest bridge in the world. In a storm in the winter of 1879, the Tay Rail Bridge collapsed while a train was passing over it, resulting in the loss of 75 lives. The Tay Bridge disaster was the most serious in a series of failures of cast iron railway bridges which eventually led to the replacement of cast iron by steel in bridge construction.

The underlying cause of railway bridge collapses such as the Tay Bridge disaster was 19th century engineers' assumption that cast iron railway bridges would behave in the same way as cast iron canal aqueducts. A similar combination of untested assumptions and over-confidence lies at the heart of the U.S. sub-prime mortgage crisis and the subsequent global financial crisis. Forty years of almost continuous growth in U.S. house prices gave the impression that property was a risk-free investment. Drawing on funding made available through the securitization of mortgages, and encouraged by U.S. government policies, mortgage brokers sold high-value mortgages with low initial interest rates to borrowers with low credit ratings. These borrowers assumed that they would be able to refinance their mortgages before higher interest rates were triggered. The mortgage brokers sold on their mortgage portfolios to investment banks who in turn financed them by issuing MBSs and CDOs. Investors in CDOs were reassured by valuations based on David Li's Gaussian copula model, and by high credit ratings provided by ratings agencies. When the rise in house prices stalled in 2006, borrowers found they could not refinance their mortgages as expected, and they began to default in large numbers. Widespread defaults undermined the correlation assumptions built into the CDO valuation models, and CDO values fell rapidly. The subsequent uncertainty among investment banks over the true value of CDOs and their own exposures, as well as those of their competitors, led to a collapse in inter-bank lending and a global liquidity crisis.

The second industrial revolution

One of the obstacles faced by engineers and inventors in the 18th and early 19th centuries was the lack of standardization of parts for machines and other mechanisms. Each machine was custom built from scratch, and its parts were not interchangeable with similar machines. This meant that spare parts had to be manufactured specifically to fit one machine. In a pre-industrial age, where household and farm implements could be manufactured and repaired by local craftsmen, this was not a handicap. However, as industrialization introduced more complex machines into the home and workplace, the time and effort required to maintain non-standardized mechanisms became a significant drawback.

The American inventor of the cotton gin, Eli Whitney, was an early advocate of interchangeable parts, promoting their use at their turn of the 19th century. Whitney put his ideas into practice in the production of the muskets that he manufactured for the American army. To demonstrate the practicality of his ideas, he gave a demonstration to the U.S. Congress in which he disassembled ten guns made to his own specifications, mixed up their parts randomly, and then reassembled them.[9]

However, the cost of refitting factories with machine tools capable of the precision and accuracy required by interchangeability meant that the principle was slow to be adopted outside of industries that required high-precision manufacturing, such as the arms industry and watch making. The first proposals for the standardization of screws and screw threads, for example, were not made until the second half of the 19th century. This lack of standardization prevented the realization of some innovative designs. One of the causes of the failure of Charles Babbage to complete the development of the "difference engine," an early automated mechanical calculator, was the difficulty of manufacturing to sufficiently precise tolerances the many identical parts called for in the machine's design.[10] The general adoption of interchangeable parts and the subsequent development of mass production and the assembly line by industrialists such as Henry Ford were part of a second phase of industrialization that has been called the second Industrial Revolution.

Future trends in financial IT

The same lack of standardization that held up progress in the first Industrial Revolution can be seen today in financial IT systems. Different banks run entirely different and mostly incompatible sets of IT systems. When two banks merge, there is a period of transition from two separate IT infrastructures to a common, shared set of platforms in a process called "post-merger integration." This is always a lengthy and expensive process. The major obstacles to platform integration lie not in hardware or networks, which can be made compatible with relatively little effort, but in software and databases. Migration of transaction history from one platform to another requires a translation of client identifiers, account numbers, and other identification codes. More importantly, it also often requires a restructuring of the transactions themselves. For OTC transactions in particular, there are many different ways of representing the component parts of each transaction and its terms and conditions. Ensuring that transactions from one platform are completely and accurately transferred to another platform is a difficult and time-consuming job.

9 Huff, R. A., 2004, "Eli Whitney: the cotton gin and American manufacturing," The Rosen Publishing Group

10 Dane, A., 1992, "Birth of an old machine," Popular Mechanics, March, 99-100

Even if trade structures are migrated accurately, reconciliation of mark-to-market values – a standard check after transaction migration – may still fail due to differences between pricing models or market data used in the different platforms.

If we need a second wave of industrialization to standardize financial IT systems in investment banking, what form will this second wave take? Standardization of financial IT systems can take place in three stages. These are standardization of inter-system messaging, standardization of stored transactions structures, and implementation of interchangeable software modules. Of these three stages, the first stage is already in progress, but the second and third stages lie in the future.

The first step towards standardization of financial IT systems is the adoption of common standards for exchanging data between systems. The introduction of the ISO 15022 SWIFT messaging standards in 1995 established a market standard for messages carrying banking and securities transaction data. The successor to these standards, the ISO 20022 standards, establishes a more general and extensible framework within which the financial services industry can agree and build a wider set of standard messages. A parallel initiative, focusing on OTC derivatives products, is the Financial Product Markup Language, or FPML. The ultimate goal is to have a common and widely adopted set of financial messaging standards that cover all product types, including FX, securities, and derivatives, and all stages of the financial lifecycle, from ordering, negotiation and pricing, to post-trade reconciliation.

The goal of achieving a single common financial messaging standard is still some distance in the future. However, investment banks can take positive steps towards this goal now by adopting emerging industry standards for internal and external messaging whenever possible, and by actively promoting the design of such standards in areas where they do not yet exist. The long-term advantages of being an "early adopter" of common messaging standards will outweigh the short-term benefits of retaining proprietary protocols and taking a "wait and see" approach.

The second phase of standardization would be the adoption of common standards for storing financial transaction data in databases. Currently, trading and banking platforms frequently differ in the way they store cash flows, payment calendars, trade amendments, linked trades, and trade history, as well as in the way they handle events in a trade's lifecycle such as rollovers or early termination. A common data storage standard for trade structures would simplify the migration of trades from one platform to another. If two platforms use a common trade structure, then trade migration from one platform to the other only requires a translation of customer identifiers and other identifier codes, which is relatively straightforward.

The issue of stored transaction standardization is more difficult to address than messaging standardization. Messaging standards include layers of redundancy and are too verbose for efficient internal storage, where conciseness, speed of access, and rapid searching are key qualities. As yet, there are no clear emerging standards for internal storage of financial transactions. However, any IT development that increases the number of different database structures and transaction representations within a bank will be a retrograde step with steadily increasing long-term costs. Investment banks should seize every possible opportunity to simplify and rationalize their internal storage architectures.

A third phase of standardization would involve the development of interchangeable and compatible software modules. Instead of struggling to maintain a complex network of incompatible platforms developed by different vendors, a bank could license or develop modules that best fitted its business, and then combine them and run them on a common data storage layer where transactions of all types are stored using common storage standards. The current "spaghetti" network of incompatible systems, point-to-point interfaces, and complex and fragile data staging and transformation applications that is seen in all banks would be replaced by a simple, stable, and scalable cross-asset architecture. Obstacles standing in the way of achieving this goal include the difficulty of defining and agreeing software standards with a sufficiently wide scope; the current level of investment in proprietary platforms; and the time, effort, and expense of converting to open standards.

Responsibility for making progress towards open software standards and interchangeable modules may appear to lie mainly with financial software vendors. However, vendors have little incentive to cooperate on open standards, as it will dilute their customer lock-in. Investment banks and other financial institutions need to apply concerted pressure on their software vendors to kick-start the vendor development of open financial software standards.

Conclusion

In the first phase of financial markets industrialization, the international investment banking industry and the capital markets on which it depends were both transformed. Most of the changes that came out of this transformation were beneficial. Increased market transparency, development of new financial products and markets all enhanced the flow of funds through the world's financial systems. Some impacts, such as the growth in product complexity which outpaced risk management capabilities, had harmful effects, and the lessons learnt from these will ultimately strengthen the financial sector. Just as an information technology revolution both triggered and enabled the first phase of the industrialization of investment banking, so a second IT revolution will be required to complete the process. Banks and other financial institutions can take practical and pragmatic steps towards initiating this second wave of industrialization in financial IT.

PART 1

Compliance Function in Banks, Investment and Insurance Companies after MiFID

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Abstract

The risk of compliance comes from the failure to comply with laws, regulations, rules, self-regulatory standards, and codes of conduct. This article focuses on the evolving scenario of the compliance function within banks, investment and insurance companies operating in Italy. We developed four areas of research questions: (i) Does the positioning of the compliance function in the organizational structure start "at the top"? (ii) Are roles attributed to the compliance function coherent with the associated responsibilities? (iii) Do firms implement measurement methodologies to minimize their economic impact? (iv) Is the interaction between the compliance function inside and outside the structure appropriate for the aim of the compliance? Focusing on the first question, almost half of our sample are reporting to boards of directors. Regarding the responsibility assigned to the compliance function, the function itself feels the need for the compliance culture to be stronger and that it should be a priority. A significantly higher number of financial players have implemented methods to measure the risk. Regarding the interaction in/out of the structure, the vast majority of intermediaries believe that the compliance function could carry out an active role for innovative processes in investment services, but only a minority of the sample shows a virtuous situation of a connection between the value system and the compliance principles and the internal incentive system.

The purpose and the features of the compliance function in banks, investment and insurance companies are the subject of various normative suggestions, from preparatory efforts of the Basel Committee for banking surveillance to the MiFID Directive with its related enforceable regulations. The risk of compliance or even worse, of non-compliance, "is defined as the risk of legal or regulatory sanctions, material financial loss, or loss of reputation" [Basel Committee (2005)] as a result of the failure to comply with laws, regulations, rules, self-regulatory standards and codes of conduct. In recent years there has been no need for examples, the financial sector has suffered a massive loss of reputation.

This study focuses on the evolving scenario of the compliance function within banks, investment and insurance companies operating in Italy and on the effects of applying the MiFID Directive. Eighty-four financial intermediaries took part in this study. Due to the large number and variety of the sample, it was possible to differentiate the results, using a dual set of criteria: a) the prevailing workability within international and domestic intermediaries; and b) the intermediary typology, creating a distinction between banks, cooperative banks (CBs), other financial intermediaries (investment companies), and insurance companies. The data was collected by SDA Bocconi using a questionnaire and the collection ended in March 2009. Analogous to the previous survey carried out in 2007, it was conducted in partnership with SIA SSB Group.[1]

With reference to the contents, we developed four areas of research questions: (i) Does the positioning of the compliance function in the organizational structure start "at the top" as the Basel Committee suggests? (ii) Are roles attributed to the compliance function, their knowledge, and their instruments coherent with the associated responsibilities? (iii) Do firms implement measuring and management methodologies to minimize their economic impact? (iv) Is the interaction between the compliance function inside and outside the structure appropriate to the aim of the compliance?

The positioning of the compliance function within the organizational structure

The first area of investigation concerns the positioning of the corporate compliance function in the company organization chart. The aim was to present the models used by the individual businesses taking into account: 1) the positioning of the function within the organizational chart; 2) the interdependence with the other functions of the company; 3) the microstructure, based on the internal roles, tasks and areas of competence; and 4) the characteristics of strategic planning, the resources available and the relevant methods used.

1) Positioning of the function in the organizational macrostructure: "compliance starts at the top" [Basel Committee (2005)]. The Basel Committee in its first document concerning compliance, dated April 2005,

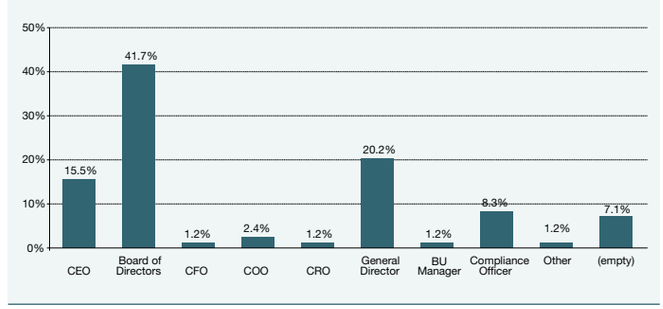

Figure 1 – To whom does the compliance function report? (total sample, relative frequencies)

suggested that the function be located at the top of the structure. It could, therefore, guarantee its legitimacy in controlling and initiating an honorable process of dissemination of the compliance culture by the example given, in primis, by the board of directors and top management. The key element for the adequacy of the location chosen for the organizational compliance function is the position of the compliance officer in the organizational chart. The evidence from 2009 confirms the general tendency that the compliance function is given a dignity and independence similar to that of internal auditing and almost half of the respondents made the choice of reporting back to the council (Figure 1).

2) Interdependencies between compliance and other company functions (the internal network) – The second element characterizing the organizational model is represented by the network market that revolves around the function of compliance. In general, the level of integration of the compliance function with other structures (expressed by the respondents in terms of perceived operational interdependence, on a scale of 0 to 10) is not high (Table 1), with a mean value of 4.30, even though there are some differences between domestic and international banks. An exception to this is the insurance sector that is characterized by a weaker intensity of relations between compliance and the other functions, perhaps justifiable in view of its more recent presence in the supervisory discipline.

As expected, the highest intensity of interdependence is found within administration and control (board of directors, board of auditors, and supervisory board established under Law 231/01) and other functions of internal control (internal audit, operational risk management) or with legal and organizational jurisdiction (legal function, organization). The compliance function is required to report back to company officers and especially to the board of directors, which is held responsible for compliance

1 This study was carried out by the Research Division of SDA Bocconi School of Management in partnership with SIA SSB Group and AICOM (Associazione Italiana Compliance) [Tanzi et al. (2008, 2009)],

within the company. Regular and direct reporting is, therefore, functional to allow administration to have the awareness required to assume this responsibility in the company.

A second area in which strong interdependencies have been detected is between the compliance function and other functions of internal control. These are essential for giving shape to a system of internal controls that is collectively qualified to ensure sound and prudent management of the intermediary. However, there appear to be important differences between domestic and international intermediaries in the intensity of the relationship between the compliance function and, respectively, the legal and internal auditing functions. The intermediaries working internationally declare a level of interdependence that is lower for auditing activity than it is for legal activity, focusing on seeking synergies in how certain related activities are carried out. For example, in the interpretation of new regulations and the resulting effects on the business. On the other hand, the greater separation between compliance and auditing – in terms of the findings of the 2007 survey – reflects the full acceptance of the supervisory regulations.

On the second level of control, the connection with the risk management unit is significantly aligned for all the sample and is higher than the common mean value. Such a relationship thus allows compliance to benefit from important signals about assessment and reporting models from the perspective of the integrated risks of the company. Compliance risk governance is not differentiated from the other functions of risk management and control, except for the mission that distinguishes it. For example, the prevention and management of the risk of non-compliance to the rules, internal and external, to preserve the good name of the intermediary and the public's confidence in its operational and management correctness, which contributes to the creation of business value.

From the analysis of the operational interdependencies, what also emerges is the limited collaborative ties with management and staff training functions, sales, and management support (personnel, human resources, sales, IT). The weakness of the relationship between compliance and HR appears particularly critical because it is capable of undermining the actual involvement of compliance in verifying the conformity of incentive schemes. The supervisory rules recall the need to define mechanisms to manage human resources and incentive schemes that are responsive to the objectives and to the indicators of behavioral conformity. This is to ensure that the internal and external rules are respected by all the individuals involved. The weakness of interdependence between compliance and sales highlights how this is not the place where compliance can express its contribution to the validation of new products or business choices that involve significant innovations. In this context, the cross-comparison between operational reports of the compliance function to the system of internal controls and business and organizational functions

Company functions linked with compliance	Mean value
Legal function	**6.14**
Internal auditing	6.03
Risk management (operational risk)	5.14
Organization	5.41
IT	3.84
Personnel	3.39
Sales	4.20
Supervisory board (ex Law 231/01)	5.49
Board of auditors	5.00
Board of directors	5.32
Personnel management	2.96
Administration	2.87
Control committees	3.15
Statutory reporting manager (Law 262/05)	1.85

Table 1 – Level of interdependency between the compliance function and other company functions (0=min- 10=max)

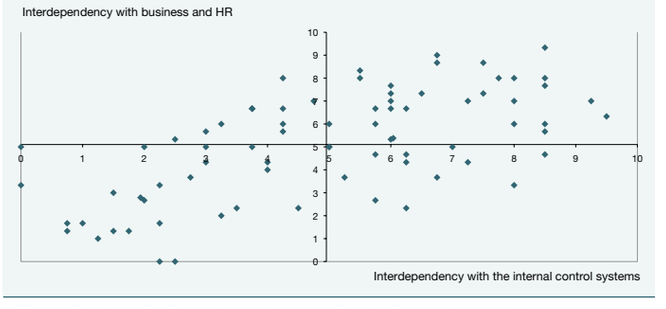

Figure 2 – Level of interdependency with the internal control systems, the business, and HR (total sample)

still reveals a wide variety of internal networks in financial intermediation that, as a result, highlights a discrepancy in the relational models and in the behavior of the compliance function in the organization (Figure 2).

The underlying trend, expressed by the sample, essentially identifies two dominant models:

- The first, identifiable as driving compliance, has a strong impact on both management and risk control, characterized by the joint presence of strong interdependencies with the control functions and with the sales and HR units (Figure 2, top right hand quarter).
- The second model is a compliance function that has still not reached its potential, having weak reporting both to the control functions and to the sales and HR units (Figure 2, lower left hand quarter).

3) Microstructure of compliance function – the analysis of the internal structure of the compliance function (microstructure) took into account both the size of the units and the internal distribution of the tasks. The compliance function is in most cases (55% on the total sample) a

structured and comprehensive unit, equipped with dedicated staff. In smaller cases, on the other hand, in particular CBs, there are more frequently monocratic solutions, characterized by the sole presence of a compliance officer who, in certain situations, resorts to outsourced functions. The solution represented by a compliance function that benefits from staff from other structures within the bank is present in less than 20% of the sample. More than 70% of international intermediaries, generally represented by large companies, have articulated facilities, compared to those with a purely domestic matrix for which the percentage falls to 45%. Moving on to the size of the compliance function, one notes that the average number of employees of the compliance function lies between one and five full time staff, equivalent to 64% of cases, confirming the characteristics found in the 2007 survey, but the range is between 0 and 500 full time employees.

4) Planning compliance activities and which resources to use – the effectiveness of managing compliance risk makes it increasingly important to carefully plan and program actions and participation in the compliance function within the company structure, as seen in the preparation of a formal action plan in the majority of cases (91%). The planning activity of the compliance function should include their management and the efficient use of any corporate resources allocated to the function. The cases of an independent budget for the compliance function are more frequent than in 2007 (46.4% versus 31.4%), although domestically such an allocation is not yet qualified as a usual procedure as compared to the international players. This applies in a more marked way to the cooperative banks than to the other types of intermediaries. As of 2007, the amount of the budget allocated by all the domestic banks and other intermediaries lies below €500,000. For foreign banks, where there is a growing business and organizational complexity and a need to ensure tangible autonomy and independence in the compliance function, the financial resources are sometimes at levels higher than the 2007 budget (with 7% of the sample up to €2 million and 10% of the sample over that amount).

Roles attributed to the compliance function

To understand the effectiveness of the compliance function it is necessary to consider the resources (human) and the techniques used (the information systems developed in software, hardware, and communication networks) to evaluate whether they are appropriate for the foreseen changes and to assess the trend of costs that their use, and more generally the execution of the compliance function, entails. Only in this way is it possible to put some light into the "black box" of this new company function, helping to stimulate debate – which is already very lively in the companies – on what to do and on how to do it to create a competitive advantage element and to not only view it as a "supervisory burden." In this part of the study we try to: identify the skill level used in carrying out the tasks; understand the responsibility of the compliance officer; note the degree and type of dissemination of IT support for the activities of the function; and highlight the main factors of change expected from the function, and estimate the expectations about the related costs for the next three years.

1) Level of skills and time allocation within the framework of the compliance function – In this study we note the level of skills of those currently engaged in the compliance function (their various know-how, ability, and experience) who were asked to fill in this evaluation. The most important skills are those covering the regulation framework and the investment products and services, followed by legal competences, those relating to the organization, and auditing. Interpretation of the compliance function using a more traditional view (external regulations) seems to prevail in the broader strategic outlook of compliance business partners. The knowledge appears homogeneous for all financial intermediaries. This could emphasize the need for such intermediaries to have similar skills in the compliance function despite their positioning at different points in the production-distribution chain.

2) Responsibilities of the compliance function – with reference to the responsibilities of the compliance officer, various items, listed in Table 2, were taken into consideration. In general, one notes that from this point of view the function is defined by a small difference between the average values which describe its responsibilities and that involves, at the strategic level, the protection of compliance culture and, at the operational level, the management of the qualifying processes of its activities. For 82% of the intermediaries (69 in absolute numbers) there is a detailed description which is formalized by the assigned tasks. The remaining 18% did not reply or do not possess such a description. It is considered fundamental that there be a formalized description, highlighting in detail the responsibilities of the function, its links with top management, business line and support units, and others working in the system of controls (supervisory organ ex 231/2001, audit, risk management). The total or partial lack of such a description renders the responsibilities of the function unclear, and hence the organizational solutions it adopts. This obviously gives a marked negative value when it comes to judging how adequate the function is.

3) Distribution of IT supports and resulting investments for the compliance function – compared to the previous edition of the survey, it is confirmed in principle that the compliance function can draw great benefits from adequate technical resources when faced with a wide range of activities and involvement, and is characterized by great pervasiveness within intermediaries and banks. This availability is essential and of growing importance with the size, degree of diversification, and spatial breadth of the intermediary increases. In 2007 a little over half of the sample did not use dedicated applications. A significantly greater number of international intermediaries replied positively than domestic ones. The difference between banks and other intermediaries was not as strong, but it was

Responsibilities	Mean value
Strong involvement in the daily activities	7.28
Presiding links to the supervisory authority	7.67
Ensuring that the compliance culture is present top-down within the company	**8.41**
Developing the regulatory infrastructure of the group/each single intermediary	7.00
Consulting and guiding on regulatory matters	8.05
Implementing the compliance infrastructure	7.90
Evaluating whether the compliance function is adequate and appropriate	6.56

Table 2 – Responsibilities of the compliance Officer (from 0 = min to 10 = max)

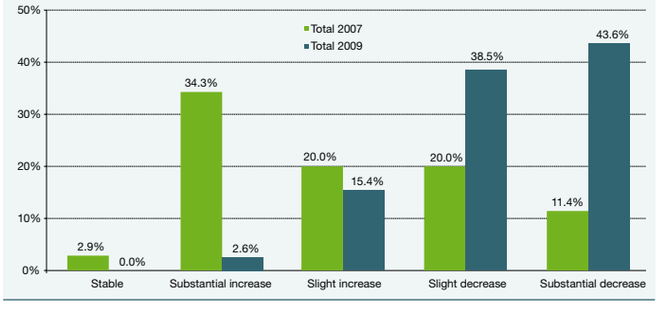

Figure 3 – Expectations about the costs of compliance in the next three years (2007 versus 2009, relative frequencies)

always present; it was the latter that used dedicated applications. In this edition of the survey, eight cases did not reply to the question, while the remainder is divided between those that have no dedicated technological applications [48.8% (41 cases)] and those that replied positively [44% (37 cases)]. In situation where there are dedicated applications, the information on the running of the compliance function is drawn from other information systems and procedures of the company. The most widely used sources are autonomous and customized extractions from other information subsystems in the company (34 cases), and to a lesser extent from systems and procedures used for operating risk (19 cases) and from control management (nine cases). There are no significant differences between the different types of intermediaries, or between domestic and international ones. One can only note that there is a greater number of insurance companies and domestic intermediaries use autonomous extractions. What we observed in the 2007 data can also be seen in the current survey, namely the partial overlap between operational risk management and of the compliance in terms of some events leading to risk and to their monitoring, which partly justifies their responses.

4) Reason for change and progress expected from the costs of the compliance function – the answers given in the previous survey showed, in general, the prevalence of the regulatory factors context, ranking at the same level the evolution of European and domestic legislation. This was then followed by a certain distance by the awareness of sanctions by control units. In fourth place appeared to be the wish to improve the quality of customer services. The best practice in the sector, the interventions of the Basel Committee, and the technological changes had scores below average (confirming the scarce inclination of the subject). In the new survey, on a 1-10 scale of degree of agreement, between the evolution of domestic legislation (8.85) and the evolution of European legislation (7.60), commitment of top management (7.79) becomes crucial. The other answers are in line with evidence from the previous survey (in fourth place was the resolve to improve the quality of customer services, in fifth the awareness of sanctions, and so on). In last place is the confirmation of technological change, once again with limited answers.

In the previous survey, we observed that the expectations of cost growth were relatively more prevalent in international financial intermediaries (61%) than in the national (50%) ones. This seemed somewhat surprising, since compliance capabilities appeared more advanced in international intermediaries. In this survey, the cost deceleration appears generalized: the crisis in the sector has led to limiting costs, even though those for compliance, considering all that has recently occurred, should not change as drastically as indicated (Figure 3).

Measuring, transferring, and mitigating compliance risk in the investment industry

We take an in-depth look at the degree of development of the compliance risk management process, namely those phases that enable the measurement and, consequently, active management of the positions at risk. In particular, we studied the measuring process and the mitigation solutions.

1) Measurement of compliance risk – the 2007 survey showed that only 42% of the respondents completed the qualitative/quantitative phase of the measuring process, while in 2009 that percentage had risen to 46.8%, proving that there was increasing adherence to regulatory constraints. What has markedly changed is the spread found when comparing intermediaries, in particular those who mainly cover the domestic sector, as compared to those involved in international activities or direct foreign governance. In the 2007 survey 26.3% of domestic firms used a metric for compliance, in 2009 that percentage had risen to 44.9%. The widening of the sample, compared to 2007, results in a rebalance for the intermediaries covering foreign areas. For the international subsample, the percentage of firms capable of measuring risk went from 66.7% to 50%. Evidence for the 2007 results comes from the segmentation of intermediaries: in 2007, banks and other financial intermediaries exhibited a different behavior. In 2009, the evidence shows how the approaches were more homogeneous. The main difference is between insurance companies and cooperative banks (CBs): the latter show a lower value

compared to the whole sample. This depends on the complexity of the CBs, which frequently choose a network solution to minimize costs.

2) Mitigation tools for the compliance risk – there is a difference between the domestic and international areas of activity by mitigation solutions. If we consider the no-replies as a lack of specific tools used to manage risk, only 9% of the domestic candidates apply instruments aimed at limiting risk. This increased to 28% for the international sector. Overall, only 15.5% implemented tools to manage the compliance risk; the majority (62%) used insurance tools. This is a major difference with the 2007 survey, when no firms used to transfer the risk. A significant number of firms introduced codes of conduct to minimize the compliance risk probability. Only in banks were there cases where the code of conduct was not implemented. The use of a specific code of conduct by business lines shows they are associated with the negotiation of financial instruments, defined as trading and sales; this is followed by asset management and investment banking. There are no significant differences between the international and domestic institutions except for retail banking, where no positive responses were provided by the former group.

Compliance function's interaction inside and outside the structure

The compliance function's interactions both internally and externally are examined in four areas:

1) The internal and external communication instruments used by the compliance function.
2) The contribution to innovation processes that affect the area of investment services.
3) The connecting mechanisms and processes between the compliance function and the system of corporate values and between the compliance function and the incentive system.
4) The involvement of the compliance function during the implementation phase of the MiFID Directive.

1) Internal and external communication tools – in the regulatory framework, the compliance function is defined as a second level control function. Consequently, it is essential to communicate both within the structure of the intermediary and outside, through communication processes that encourage a dialogue between the institutional players and the process that disseminates the company values to the public.

As can be seen in Table 3, a high level of importance is allocated by the compliance function to Internet and email, as forms of communication that are both capillary and less expensive, through which a wide range of information can be sent to all the levels of the company. Meetings are also allocated relatively high values. Meetings are an instrument of communication for small groups of people, with high relational content, but costly in terms of time and personnel. It is, therefore, plausible that these are used in particular by the larger intermediaries and above all during the initial phase when preparing company policies. The use of circulars, as a means of spreading the common interpretation of hetero- and self-regulation clearly and unequivocally, is especially appreciated by banks and other financial intermediaries, while it is not as widely used by insurance companies. Moreover, the communication of compliance values through the internal code and training courses carried out mainly by international intermediaries is, in fact, less crucial for domestic intermediaries. Linking this last point with what was said concerning the responsibilities of the compliance officer indicates an element of inconsistency, between the willingness to make the culture of conformity and the use of internal communication instruments. In Table 2 the mean value attributed to "ensure that the culture of compliance be present top-down" is 8.41, on a scale from 0 to 10. With this indication one could expect that, even during the application of internal communication tools, it was sustained by dedicated training courses or, at least, by a widespread circulation of the internal code stressing this point.

For external communication tools, the survey considered the elements identified in Table 4. The instruments with greater external visibility, such as the documents on the website and the use of codes of conduct, are more widely used by international intermediaries. Domestic firms indicated that they tend to use financial statements and congress participation for communication.

Internal communication tools	Mean value
Intranet and email	**8.44**
Meetings	7.51
Participation in training courses	4.25
Dedicated training courses	4.31
Internal codes	4.65
Circulars	5.68
Report to administration	7.38
Report to internal audit	5.08

Table 3 – Internal communication tools (importance 0 min -10 max)

External communication tools	Mean value
Annual report	3.62
Social balance sheet	3.29
Code of conduct	3.43
Documents on the website	**4.33**
Conference participation	3.45

Table 4 – External communication tools (importance 0 = min - 10=max)

In particular, with reference to the annual report, 30% of respondents, regardless of the type of membership, gave it a communication value of zero on a scale from 0 to 10. It is important to think about this figure on which the annual report is based, and the type of instrument used to transmit a message of reputation and cultural integrity to the public and to the supervisory authorities.

2) Contribution of the compliance function to the innovative processes – the compliance function, through the spreading of a common culture aimed at respecting the rules and the dialogue between the various company functions can contribute to improving opportunities for innovation in investment services. The design of new products or the creation of processes to improve the operating conditions within the intermediaries in acting according to the rules of the game can become strategic when it comes to enhancing the reputation and capturing of new market shares. From the empirical survey one notes that 76% of the domestic intermediaries and 78% of the international ones consider that the compliance function could have a driving role in the innovative processes on the stipulation of investment services. In banks mainly operating domestically, as already pointed out in the previous survey, the proximity of the compliance function to other business functions involved in the processes of products/services production could facilitate the dialectic exchange and support the comparison.

3) Link between the compliance function, the system of corporate values, and the incentive system – for companies subject to regulation, the search for innovative solutions may not lead to working outside the external and internal rules of the game. The sensitivity of this aspect came to light internationally during the last financial crisis: the trustee in the allocation of resources between investors and borrowers needs the highest level of protection to avoid the systemic risk of crisis transmission by the financial sector to the rest of the economy. Compliance with the rules must be in the DNA of the financial intermediaries who are subject to regulation since they are allowed to operate for savers who contribute their savings and the subsequent choice of investment leading to the development of the economic system.

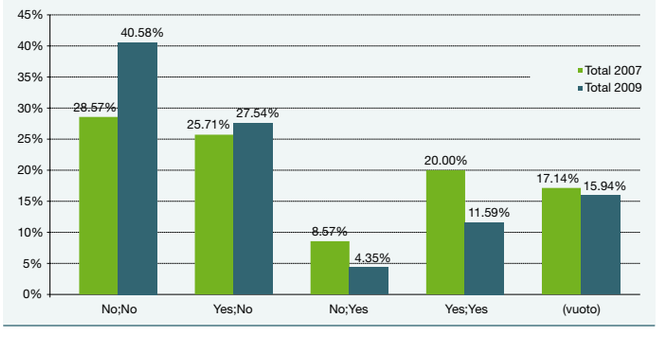

Figure 4 – Connection between compliance function – value system – incentive system (2007 versus 2009, relative frequencies)

This statement implies on the one hand, visibility, when the compliance function finds it fits the value system of the corporation and, on the other hand, concreteness, when in the company there are operational mechanisms or processes that connect the principle of conformity to the external and internal rules with the incentive system. The survey notes the presence or absence of such connections and suggests the following combinations (Figure 4):

- Absence of a link with the system of values and incentives (no; no).
- Presence of a link with the system of values, absence of a connection with incentives (yes, no).
- Absence of a link with the system of values, presence of a connection with incentives (no; yes).
- Presence of a link with the system of values and incentives (yes; yes).

As in the previous survey, in the current study the "virtuous" situation of the presence of a connection to both the levels of system of values and incentives also characterizes the minority of those interviewed 11.6% of cases. At the other extreme, the absence of both links is recognized in 40.6% of the sample (this was 28.6% in 2007). In 27.5% of the cases, the link is present at the level of system values, but not for incentives, while for only 4.3% the situation was the opposite, i.e., the link is exclusively present at the incentive level. With regard to the connection between the values of compliance and the incentive system, when present it is mainly represented (in 68% of cases) by the use of evaluation processes through subjective procedures. In a minority of cases, objective procedures are given where indicators of conformity in the individual incentive system are used.

4) Level of involvement of the compliance function in complying with the MiFID Directive – this survey aims to explicitly observe the involvement of the compliance function in internal processes of corporate adjustment to the MiFID Directive, taking into account its current Level 3 stage. The results prove that the compliance function is mainly seen as having a driving and advisory role, being less relevant during the implementation phase: 52.4% of those interviewed pointed to the advisory role, which reflects the intrinsic planning part of the function, while 47.6% pointed to its thrusting power, 14.3% reported on its role of accomplisher (compared to 2007, what is changing is the perception between its roles as a driving force and as an advisory service, in the present phase the latter prevails). The thrust is especially present in the compliance function of international intermediaries. For domestic firms what is preferred is its internal advisory approach. On this point, there is probably also a learning curve of the potential, inherent to the role of the compliance function, which some domestic intermediaries still have to master. There were also significant differences of interpretation between the types of

intermediaries, where the most striking was between banks and insurance companies, but also between banks and other financial intermediaries and within the bank sector. For banks, the compliance function is seen as the driving force and advisor, covering the broad majority of the sample (over 60%). Only a minority of insurance companies considered these two properties important, confirming the recent history of the compliance function in this sector. Finally, always with reference to the type of intermediaries, the other financial intermediaries and the smaller sized banks considered the advisory role most significant while that of being a driving force was only noted by a few of the smaller banks.

Conclusion

This study focuses on the evolving scenario of the compliance function within banks, investment firms and insurance companies during the implementation of the MiFID Directive. Focusing on the positioning of the compliance function, almost half of those who were interviewed are reporting to the boards of directors. Alternative solutions are still on the way and the link to the top is through the general director or the CEO as mediators. Regarding the responsibilities and the roles assigned to the compliance function, from a strategic point of view, the function itself feels the need for the culture to be more compliance-focused and that there should be, at a working level, qualifying management procedures for the activity itself. A significantly higher number of financial players have implemented qualitative/quantitative methods to measure the risk and have started to transfer the impact using insurance contracts. Regarding the interaction in/out of the structure, the vast majority of domestic and international intermediaries believe that the compliance function could carry out an active role for innovative processes in investment services, but only a minority of the sample shows a virtuous situation of a connection between the value system and the compliance principles and the internal incentive system. With regard to the role of the compliance function in the implementation of the MiFID Directive, the results reflect the net interpretation of the role mainly as pushing (initiator) and consulting (advisor) of the compliance function and less relevant during the implementation phase (actor). The innovative effort is very strong in the compliance function of the international players, while the domestic players prefer the internal consulting approach. This is probably because there is a learning curve of the intrinsic potentials of the role of the compliance function that still has to be carried out by some domestic intermediaries.

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PART 1

Investor Irrationality and Closed-end Hedge Funds

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Abstract

The present study assesses the rationality of investors who pay large sums to hedge fund managers for their services. For my analysis I use a sample of closed-end funds which invest their capital in one or more open-ended hedge funds. The results imply that investors rationally exploit the available information when deciding whether to engage in the initial public offering of a new closed-end fund. However, I also find evidence that investors react with a burst of irrational pessimism to the worsening economic conditions in the second half of 2008.

The purpose of this study is to assess the rationality of investors who engage the services of hedge fund (HF) managers. To start this analysis I first consider the in- and outflow patterns of the HF industry in the past decade: from the end of 2000 to June 2008 the total inflows into the HF industry was an impressive U.S.$2100 billion with total asset under management (AUM) of U.S.$2339 billion at the end of this period. However, when financial market prospects changed dramatically in the second half of 2008, investors started worrying about their money and large sums were withdrawn. The capital outflow in the second half of 2008 amounted to U.S.$821 billion which is more than a third of the total AUM before the crisis.[1] These numbers imply that there are periods in which investors are optimistic about HFs in general, and there are times when they do not have much trust in the abilities of HF managers.

I interpret this capital in- and outflow pattern as a sign of irrational behavior. This conclusion is based on the following reasoning. First of all, HF managers are expensive: in addition to a management fee of 2%, HFs usually charge a performance fee of 20% [Fung and Hsieh (1999)]. I claim that any rational investor who accepts such an extensive fee structure for an engagement with a fund expects that the fund manager provides a distinctive and superior service. The in- and outflow numbers, however, indicate that for certain time periods the investors have a uniform opinion about the whole HF industry; that is, they implicitly assume that different funds follow similar strategies. But, if all managers followed similar strategies, it would be unlikely that they would be the result of manager specific abilities such as an elaborate research process or profound knowledge of financial markets. More likely, these strategies would rely on publicly known investment rules. Hence, investors would pay extensive fees for a service which they could possibly provide themselves with little effort, or through a mutual fund manager at much lower costs.[2] Consequently, I conclude that the observed in- and outflow pattern suggests irrational behavior.

In the main part of this paper I assess the rationality of investors by relying on a sample of listed closed-end hedge funds (CEHFs). A CEHF is a closed-end fund (CEF) which invests its assets in one or more HFs. The net asset value (NAV) of a CEHF is calculated as the sum of the reported market prices of the investments in the underlying HFs. Insofar as the exact composition of the HFs is generally not known I have to assume that these prices reflect fundamentals and provide the best estimate of the current value of the fund. Further, I assume that deviations from the share price (SP) of the fund to the NAV per share express investors' expectations about the quality of future managerial decisions, i.e., the benefits from active portfolio management [Boudraux (1973)]. I refer to these deviations as discounts; if shares trade below (above) their NAV, the discount is positive (negative).[3] Positive discounts imply that investors believe the fund managers charge more fees than they add value, negative discounts imply that investors believe the fund managers' skills overcompensate for the fees. Hence, discounts in CEHFs allow us to observe investors' expectations about single HFs or a group of HFs.

My analysis focuses on two stylized facts about CEF discounts: (1) new CEFs tend to get issued when seasoned CEFs trade at low discounts [Lee et al. (1991); Cherkes et al. (2005)], and (2) discounts in CEFs move in lock-steps [Lee et al. (1991); Doukas and Milanos (2005)]. Both these observations are interpreted by Lee et al. (1991) as evidence for irrational noise trader effects.

The initial public offering (IPO) pattern of the CEHFs in my sample also indicates that new CEHFs tend to get issued when seasoned funds trade at low discounts. However, I find that this relationship is due to the informational idiosyncrasies of the IPO process rather than investor irrationality. Specifically, I find that investors rely on the available information set when deciding to engage in the IPO process of a new fund issued by a management company which already manages one or more seasoned funds. Further, the co-movement of discounts across funds does not support the notion of investor irrationality for the majority of the sample period from January 2003 to December 2008. Only in the second half of 2008 do investors react with a burst of pessimism to increasingly bad economic conditions.

I should emphasize that the reasoning applied in the present analysis is not applicable for funds which have a limited investment focus (i.e., mutual funds) since the perception of such funds is biased by investors' expectations about the funds' investment ranges. For example, it is perfectly rational for investors to have a uniform opinion about the future performance of mutual funds investing in Eastern European stocks since the performance of these funds is mainly determined by factors which are known to the investors, i.e., the economic prospects in Eastern Europe. For HFs, on the other hand, the situation is different. The investor's expectation about the future performance of the HF is solely a reflection of investors' perception of the managerial ability of the fund manager, which is a purely fund specific attribute. Finally, it is important to realize that I challenge the rationality of investors on an aggregate level. Only if the behavior of the aggregate of people investing in CEHFs exhibits a systematic irrational component, it is also observable in the results.

1 I thank Sol Waksman, founder and CEO of Barclay Hedge (www.barclayhedge.com), for providing this data.

2 Mutual funds usually charge a management fee which does not exceed 1%. Further, mutual funds are not allowed to charged excessive performance fees. Only a small fraction of mutual funds charges a so-called fulcrum fee, which has similar characteristics as a performance fee, but that is closely related to industry benchmarks and can only be charged to institutional or high-net worth investors [Elton et al. (2003)].

3 I also refer to a negative discount as a premium.

Name	List date	Market 2008	Average discount	Discount 2008	Type
Alternative Investment Strategies	Dec-96	197.4	3.80%	27.40%	MMF
HSBC European Absolute*	04-Jan	19.0*	1.6%*	1.3%*	MMF
Dexion Absolute	12-Feb	838.1	-1.70%	31.70%	MMF
Thames River Hedge	02-Apr	211.4	-0.20%	39.90%	MMF
Dexion Equity Alternative	04-Apr	99.7	2.10%	18.60%	MMF
Dexion Trading	11-Apr	108.6	1.60%	21.00%	SMF
HSBC Global Absolute	11-Apr	84.3	2.20%	33.40%	MMF
Absolute Return trust	01-May	202	-1.10%	23.30%	MMF
Acencia Debt Strategies	02-May	99.3	-0.50%	40.00%	MMF
Tapestry Investment Company	02-May	52.5	2.10%	36.00%	MMF
RAB Special Situations	05-May	15.7	16.40%	55.40%	SMF
KGR Absolute Return	11-May	50.7	1.60%	18.00%	MMF
Value Catalyst Fund	12-May	94.3	-1.80%	-4.70%	SMF
The Cayenne Trust	01-Jun	29.8	2.00%	4.40%	SMF
BlueCrest All Blue	05-Jun	241.8	2.50%	17.10%	SMF
CMA Global Hedge	07-Jun	111.3	5.00%	56.80%	MMF
Goldman Sachs Dynamic Oppt.	07-Jun	214.4	4.70%	43.30%	MMF
New Star Abs. Ret. Growth**	08-Jun	20.2**	1.8%**	3.9%**	SMF
New Star Abs. Ret. Value**	08-Jun	18.2**	1.0%**	2.9%**	SMF
Cazenove Absolute Equity	10-Jun	62.8	-0.30%	17.40%	SMF
New Star HDGE 250 Index 1x	11-Jun	52.7	1.50%	20.10%	MMF
New Star HDGE 250 Index 3x	11-Jun	2.4	3.60%	51.70%	MMF
Signet Global Fixed Strategies	11-Jun	35	-0.40%	26.30%	MMF
Invesco Perpetual Select Hedge	11-Jun	19.5	1.20%	2.80%	MMF
Aida Fund	12-Jun	24.1	2.40%	13.10%	MMF
Dexion Alpha Strategies	03-Jul	60.7	5.50%	34.20%	MMF
FRM Credit Alpha	03-Jul	56	1.00%	27.20%	MMF
BH Macro	03-Jul	942.4	-1.00%	17.40%	SMF
Gottex Market Neutral	03-Jul	25.3	3.50%	31.60%	MMF
JP Morgan Progressive	05-Jul	17.2	-1.10%	11.20%	SMF
F&C Event Driven***	06-Jul	37.7	8.70%	29.90%	MMF
Saltus European Debt Strategies	06-Jul	16.6	7.10%	35.30%	MMF
Third Point Offshore	08-Jul	123.8	11.60%	43.80%	SMF
Terra Catalyst	02-Aug	38.5	9.90%	41.30%	SMF
Black Rock Absolute Return	04-Aug	71.4	3.00%	42.90%	MMF
BH Global	05-Aug	462.2	5.50%	28.00%	SMF
FRM Diversified Alpha	06-Aug	34	20.00%	32.80%	MMF

*delisted in 09/08; **delisted in 07/08. ***delisted in 01/09

The listing date ('list date') denotes the month in which shares of the fund start trading on the London Stock Exchange. Three funds are delisted before the end of 2008. The market volume (Market 2008) is denoted in euro millions and taken at the last trading day of 2008 (or the month before delisting). The figure denotes the sum of the market volume of all share classes. The discount for month is calculated as where NAV is the month-end net asset value of the fund, and where SP is the month-end share price. The average discount (Average discount) denotes the average of the month-end discounts from inception of the fund to the end of 2008 (or to its delisting). The discount for the end of 2008 (or the last month before delisting) is denoted as "Discount 2008". If a share is traded in more than one currency class, I use the share class with the largest market capitalization. The last column (type) denotes whether the CEHF is incorporated as a single manager fund (SMF) or as a multi manager fund (MMF).

Table 1 – Closed-end hedge funds listed on the London Stock Exchange

Relation to other studies

The present paper is motivated by two streams of literature that try to explain the often puzzling patterns in discounts of CEFs.[4] The first stream is pioneered by Lee et al. (1991) which interpret fluctuations in discounts of CEFs as a symptom of irrational investor behavior. A countermovement initiated by Ross (2002a, b) relies on the reasoning of neoclassical finance and refuses to accept irrationality as the primary argument. These latter studies re-adopt several ideas first discussed in Malkiel (1977).[5] I emphasize that my study does not intend to provide new explanations for the CEF puzzle but rather to examine whether investors exhibit irrational behavior.

The study of Lee et al. (1991) is based on the noise trader model introduced in DeLong et al. (1990). In this model discounts are driven by irrational investors who commonly react to unqualified information (noise) and randomly drive prices of CEF below and above their NAV. Rational investors who want to exploit their superior beliefs have to account for the possibility

4 These puzzling fluctuations are usually summarized as the CEF puzzle [Lee et al. (1990)].

5 I do not consider the effect of market frictions but refer to Pontiff (1996) for a study on the influence of arbitrage costs and to Datar (2001) and Cherkes et al. (2005) for a discussion on the impact of liquidity.

that their irrational counterparts take even more extreme positions during their investment period. As a consequence, prices are not fully driven back to the NAV in equilibrium and usually trade below their NAV due to the additional risk introduced by noise traders. Lee et al. (1991) refer to these collective bursts of optimism or pessimism as investor sentiment.[6] Two implications of the noise trader model are relevant for my study: funds tend to get started when seasoned funds trade below their NAVs and discounts of seasoned funds move together. The second stream of related literature initially proposed by Ross (2002a, b) explains changes in discounts based on agency costs. These studies usually explain how funds get issued at a premium and then move into discounts.[7] However, none of these studies manages to explain the comovement in discounts which is reported in several studies [Bodhurta et al. (1995), Pontiff (1997) and Doukas and Milanos (2004)]. Hence, comovement in discounts across funds is a strong argument favoring irrational investor behavior.[8]

Description of the sample and variable definition

The sample for the main analysis of this study consists of 37 CEHFs that have been admitted to trade on the London Stock Exchange (LSE) between 1996 to 2008 (Table 1). I do not consider funds that have been admitted to other markets prior to being listed on the LSE.[9] Information on the funds is gathered from several sources: the annual reports are the primary source for information on the manager of the fund and the issuance of new shares; the monthly newsletters provide month-end net asset values (NAVs) per share; data on month-end shares prices and market capitalization are obtained from Datastream. CEHFs can be divided into two categories: single manager funds (SMFs) and multi manager funds (MMFs). A SMF is a CEF that invests its assets according to the advice of a single HF manager. The SMFs usually act as feeder funds for seasoned, unlisted HFs. A MMF is a CEF that exhibits a fund of HFs structure. The manager of the MMF chooses to invest the fund's assets in several HFs that he or she expects to provide superior performance. Hence, the performance of a MMF depends on the ability of several HF managers. The MMFs outnumber the SMFs both in number and market capitalization. By the end of 2009, the 24 listed MMFs had a market capitalization of €3,594.11 million, the 13 SMFs had a market capitalization of €1,212.89 million.

The difference between the SMFs and the MMFs is best observable in the fee structure. Investments in the MMFs are subject to two layers of fees. The managers of the MMFs charge management and performance fees for selecting other fund managers. Additionally, the selected HF managers charge management and performance fees for their services. In my sample the managers of the MMFs charge, on average, 1.3% management fee and 11.2% performance fee. The SMFs charge only one layer of (significant) fees. While the investment in the master fund is subject to management and performance fees, at the level of the SMF a (comparably) small administration fee is charged. Several CEHFs are offered in more than one currency class. The most common currency classes are U.S.$, euro, and pound sterling (GBP). Each currency class has a separate account and costs are allocated to these accounts. Moreover, each class has its own international security identification number and is individually traded. For each fund I only consider the class that exhibits the highest market capitalization since this class is usually the most liquid.

I express the discount of the asset at the end of month as $disc_{i,t} = (NAV_{i,t} - SP_{i,t})/NAV_{i,t}$, where $NAV_{i,t}$ and $SP_{i,t}$ are the month-end NAV and month-end share price of fund i for month t. Note that discounts are positive if the fund's shares trade below its NAV per share. Following Lee et al. (1991), I construct a value weighted discount (VWD) index: $VWD_t = \sum_{i=t}^{n_t} w_{i,t} \times disc_{i,t}$, where n_t is the number of funds at the end of month t and $w_{i,t}$ is the weight of fund i at the end of month t. The weight is calculated using the month-end market capitalization (in euro) of the fund divided by the total market capitalization of all funds trading at the time. Monthly changes in VWD are denoted by $\Delta VWD_t = VWD_t - VWD_{t-1}$.

Similarly, I construct indexes only considering either the SMFs (VWDS) and or the MMFs (VWDM).

The VWD reflects the average value-weighted discounts of all closed-end hedge funds trading on the LSE. The average (median) values of VWD is 0.0037 (-0.0068). The discounts strongly increase in the second half-year of 2008 to a maximum discount of 27%.

I calculate the values of the VWD for the period January 2005 to December 2008. For this period the VWD contains at least seven constituents. Its values are depicted in Figure 1. Note that for about half the time the values of the VWD are negative and for the majority of time below 5% until peaking to almost 27% at the end of 2008. The average (median) of the VWD is 0.37% (-0.68%). These values are significantly lower than the values reported in other studies. For example, Lee et al. (1991) report that the average discount for U.S. funds was around 10% for the period 1965 to 1989, Anderson et al. (2002) report that the average discount in February 2001 is 10.9% for all equity funds.

6 Lee et al. (1991) argue that investor sentiment presents a new pricing factor for assets generally held by small investors. This assertion triggered a series of papers such as Chen et al. (1993), Chopra et al. (1993), Brauer (1993), and Elton et al. (1998).

7 Weiss (1989) reports that funds usually move into discounts within 120 days. Studies explaining such behavior are Arora et al. (2003) and Ferguson and Leitstikow (2004). Additionally, the model presented in Berk and Stanton (2007) predicts the wide variation in discounts across funds by relying on managerial ability and the implications of a long-term labor contract.

8 To my knowledge Cherkes et al. (2005) is the only study which can explain this behavior without having to rely on investor irrationality.

9 The names of these funds are obtained from the analyst report on listed hedge funds by Tom Skinner, Cazenove.

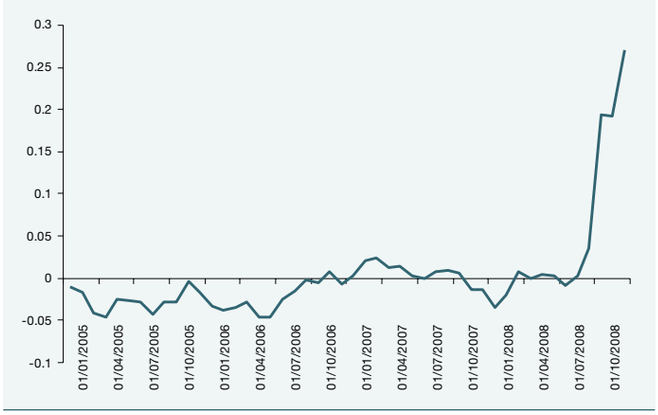

Figure 1 – Month-end values of the VWD from January 2005 to December
The VWD reflects the average value-weighted discounts of all closed-end hedge funds trading on the LSE. The average (median) values of VWD is 0.0037 (-0.0068). The discounts strongly increase in the second half-year of 2008 to a maximum discount of 27%.

Next, I compare the SMFs and MMFs for the period from July 2007 to December 2008. It is not possible to compare these two indexes for longer intervals as the SMFs tend to get issued at later times. For the considered period the SMF contains at least five funds, the MMFs contains at least 20 funds. The mean (median) discount is 5.49% (4.43%) for VWDS and 2.52% (-0.02%) for VWDM. These values are significantly different at the 1% level (two sided test). The lower levels of discounts for the multi manager funds suggest that investors believe that managers of MMFs add more value in selecting the funds than they charge for it. Considering the expensive fee structure of MMFs this result is remarkable. It indicates that investors are aware that identifying managerial ability is a difficult task, and they are willing to pay large fees to professionals for providing this service.

Raising new capital

In this section I assess whether raising new capital suggests irrational behavior as claimed in Lee et al. (1991). I first consider the launching of new funds, then I focus on the issuance of new capital by seasoned funds.

Launch of new funds

Lee et al. (1991) find that new funds tend to get launched when existing funds trade at a negative discount. They interpret this finding as evidence for the noise trader model, i.e., it is the result of irrational investor behavior. Specifically, they argue that fund managers exploit investors' irrational optimism by bundling assets together with new funds and selling them to an appreciative clientele. Nonetheless, Lee et al. (1991) have to admit that new funds also get started when existing funds trade at a discount – a clear contradiction to the predictions of their model. I observe a similar pattern (Figure 2): funds tend to get launched after seasoned funds have traded at low discounts, but I also find that when discounts are positive managers also raise capital for new funds.

Note that in 2008 four new funds were launched just after the VWD had risen to a positive level. These four IPOs raised more than €1 billion. I claim that the observed pattern is not the result of irrational behavior but based on lack of information. For most investors the amount of information prior to the IPO of a fund is restricted to what is given in the prospectus. The prospectus is a legal document that provides a potential investor with information about a new fund. Its content is specified by the authorities. The prospectus usually contains (among other information) the legal incorporation of the fund, the fee structure, the potential risks of such an investment, and the CVs of the managers. Therefore, it is a valuable tool to enhance transparency of fund investments. Nonetheless, the information contained in the prospectus usually does not considerably differ across funds, and it does not enable the investor to distinguish the specific qualities of a new

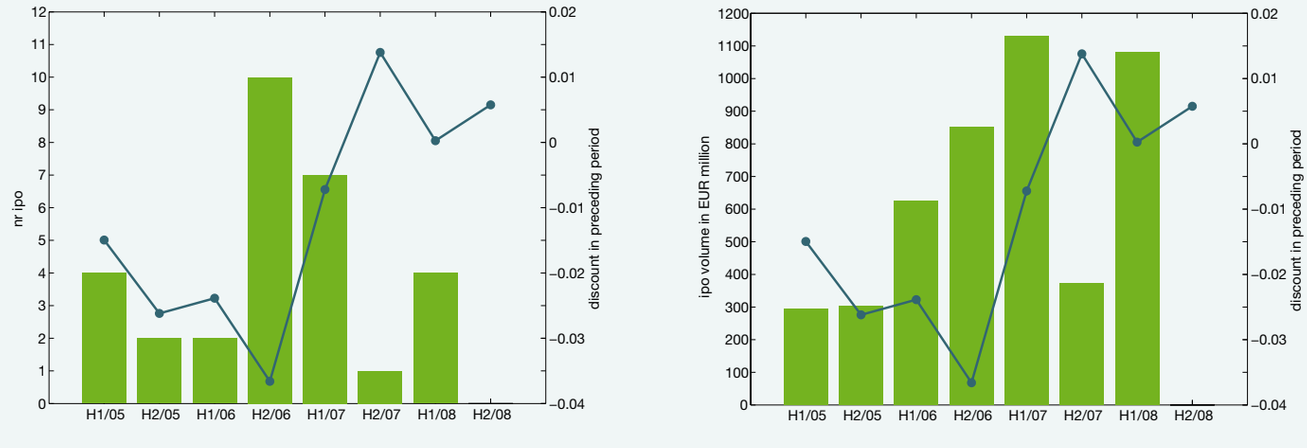

Figure 2 – Number of new fund starts in relation to preceding average discounts.

New fund	Seasoned fund	Listing date	Common manager	IPO seasoned	IPO VWD
Dexion Equity Alternatives	Dexion Absolute	04-Apr	Dexion Capital	-5.10%	n.a.
Dexion Trading	Dexion Absolute	11-Apr	Dexion Capital	-5.20%	n.a.
HSBC Global Absolute	HSBC European Absolute	11-Apr	HSBC Alternative Invst.	-1.30%	n.a.
New Star Hedge Index*	New Star Abs. Return*	11-Jun	New Star Asset Mgmt	-3.4%*	-1.80%
Invesco Perpetucal	Absolute Return Trust	11-Jun	Fauchier Partners	-3.10%	-1.80%
Dexion Alpha Strategies	Dexion Absolute	03-Jul	Dexion Capital	-4.70%	0.60%
Saltus European Debt Strat.	Acencia Debt Strategies	06-Jul	Saltus Partners	-2.30%	1.40%
Value Catalyst Fund	Terra Catalyst Fund	02-Aug	Laxey Partners	0.20%	-1.00%
BH Global	BH Macro	05-Aug	Brevan Howard	-4.10%	-0.90%
FRM Diversified Alpha	FRM Credit Alpha	06-Aug	FRM Invest. Mgmt	-3.10%	-0.60%

In my sample, 10 new funds have entitled managers which already manage seasoned funds at the time of their initial public offering (IPO).
This table denotes the name of the new fund, the name of the seasoned fund, the listing date of the new fund, and the name of the common manager.
Moreover, the six months' average of the discounts of the seasoned fund (IPO seasoned) and of VWD (IPO VWD) before the issue of the new fund is depicted.

Table 2 – Sub-sample of new issues by managers which already manage seasoned funds

fund from the seasoned funds. As a consequence, investors use the available information about the seasoned funds as a proxy for what to expect from the new fund, and, therefore, new funds tend to get issued when investors are optimistic about the existing funds. Hence, it is premature to conclude that investors are irrational as there is only little information available on which investors can rationally base their decisions.

I continue the discussion by using a subsample (S1) of 10 funds that are issued by management companies which are also responsible for the management of seasoned CEHFs (Table 2). For the funds in this subsample the investors dispose of more specific information based on the already seasoned funds. I propose that rational investors exploit this information while irrational investors still rely on their overall sentiment about CEHFs. To test this proposition, I consider the six months preceding the issue of a new fund in S1 and calculate the average discount of the related seasoned fund (IPO seasoned). Further, I compare this average with the average discount of the whole sample (IPO VWD) for the respective period. Note that in all but one case (the only exception is the IPO of the Terra Catalyst Fund by Laxey Partners) the seasoned funds trade at a negative discount before the listing of the new fund. Moreover, in all but one case (the only exception is, again, the Terra Catalyst Fund) the average discount of the seasoned funds is considerably lower than the VWD; that is, at the time of the issue of a fund in S1 investors are particularly optimistic about the management company issuing the fund. Hence, I conclude that investors exploit the available information.

It is important to note that different funds issued by a fund management company are usually managed by different teams, and in several cases the management company assigns an external investment adviser to take the final investment decisions.[10] For example, all four funds which are issued under the "Dexion label" have different, external investment advisors. However, there are important components such as corporate governance issues or structural attractions which are attributed to the management company and therefore provide a quality seal for all funds issued by the company.

Raise of new capital by existing funds

A substantial part of capital raised by CEHFs is by means of issuance of new shares by existing funds (issued capital: €2890 million). The process of issuing new shares are as follows. First, the fund management company calls for the subscription of so-called C shares. The proceeds of the issue are then managed in a separate pool. The C shares are usually not traded on a stock exchange. Once a certain limit (usually 85%) of the net proceeds is invested, the C shares are converted to ordinary shares. The rate of conversion is predefined at issue and is based on the relation of the NAVs.

Again, I break down the sample into six month subgroups and compare the issuance of new shares to the average discount of the existing funds in the preceding subperiod. The results are depicted in Figure 3 (left-hand side for number of issues, right-hand side for volume issued). It is not surprising that capital raisings usually take place at later times as there are more funds that can actually issue new shares. But the results are still remarkable as most capital is raised in 2008 – just after the average discount of the seasoned funds has moved to a positive level. Hence, there seems to be no correlation between issuance of new capital by seasoned funds and general expectations of investors about CEHFs.

At the time of the capital raising the investors have specific information about the fund; hence I expect that the issuing funds trade at low

10 I thank Tom Skinner, Cazenove, for pointing this out to me.

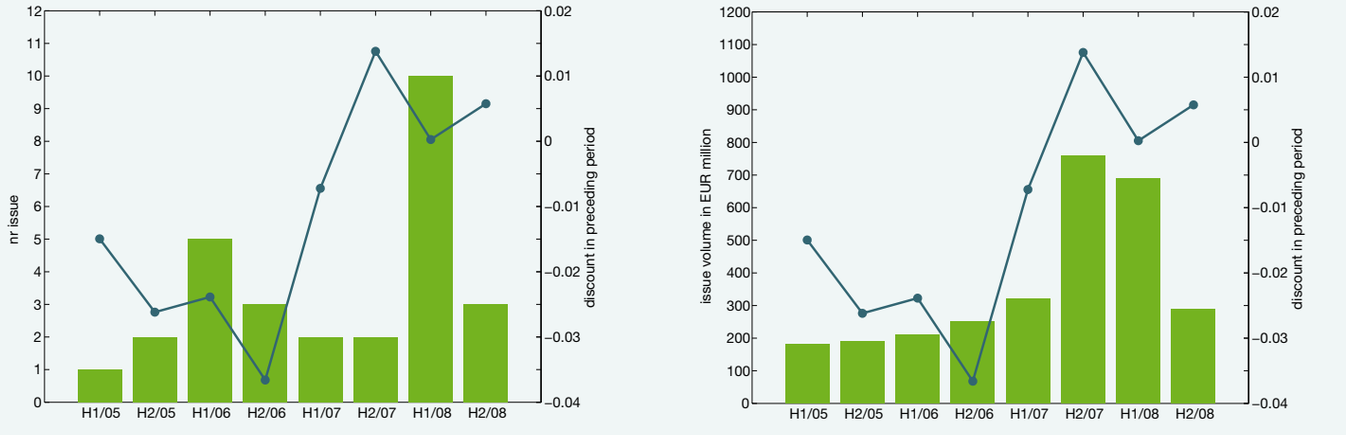

Figure 3 – Number of shares issues and issued capital by seasoned funds in relation to preceding average discounts of seasoned funds

	mean(issue)	mean (issue-VWD)	med(issue)	med(issue-VWD)
lag 0	-2.06%[b]	-1.72%[b]	-3.85%[a]	-3.81%[a]
lag 2	-2.10%[b]	-1.68%[b]	-3.45%[a]	-3.44%[a]
lag 4	-2.18%[a]	-1.99%[a]	-2.08%[a]	-2.24%[a]
lag 6	-1.30%[c]	-1.21%[b]	-2.40%[a]	-2.49%[a]
lag 8	0.80%	0.77%	0.71%	0.33%
lag 10	0.30%	0.22%	0.29%	0.23%

In my sample I find 28 cases in which a seasoned fund raises new capital by means of a share issue. I consider the cross-sectional means and medians [mean(issue)] and [med(issue)] of the discounts of the issuing funds for several lags before the new shares are issued. For example, to calculate the "mean (issue)" of "lag 4" I proceed as follows. If a fund issues new capital, I consider the discount 4 months prior to the issue. Hence, the months in which the discounts are considered usually do not correspond across funds. If the fund issues capital in more than one occasion, I use the discounts four months prior to each issue. Then the mean of this cross-section of discounts for each of the indicated lags is calculated. To calculate the difference to the whole sample [mean(issue - VWD)] I proceed accordingly. I use a standard t-test (Wilcoxon rank test) to test whether the means (medians) are significantly different from 0. a, b, c denote significance at the 1%/5%/10% level.

Table 3 – Lagged discounts before new shares are issued

linear correlation

Period	average pairwise correlation	positive at 5% level
January 05 - December 08	0.41	54.55%
January 05 - June 08	0.18	18.18%

rank correlation

period	average pairwise correlation	positive at 5% level
January 05 - December 08	0.27	41.82%
January 05 - June 08	0.19	29.09%

I calculate linear and rank correlation for every pair of funds in S2. The average of these correlation coefficients and the percentage of coefficients that are significantly greater than zero are stated. Note that the numbers considerably drop when the last six months are excluded from the consideration.

Table 4 – I consider a subsample (S2) of 11 funds that have at least 36 months of observation.

discounts before the new shares are issued. The results depicted in Table 3 support my assumption. Funds which are able to raise new capital usually have significantly negative discounts up to 6 months prior to the issue. The discounts of these funds are also significantly lower than the average discounts of the whole sample. Hence, the ability to raise new capital is related to investors' expectations about the specific fund. Further, the values are positive for lag 8 and lag 10, i.e., significant discounts are only observable within the six months prior to the issue. I conclude that managers react quickly to low discounts and complete capital raisings within few months. Moreover, as the cost of an issue usually accounts for about 1.5%-2%, the 2% premium seems to be a natural boundary for investors' willingness to engage with a capital raising.

Changes in discounts

Several studies on CEFs report that discounts tend to move together across funds. This observation is the main argument favoring irrational investor sentiment. Studies relying on rational investors do not manage to explain such a pattern. The noise trader model, on the other hand, precisely predicts this behavior. In this section, I consider how changes in discounts are correlated for my sample of CEHFs. I use both linear and rank correlation. As a compromise of cross-sectional and time-series data availability I consider a subsample (S2) of funds that have at least 36 months of data availability. S2 contains 11 funds.

Table 4 reports that the average pairwise linear correlation coefficient for the funds in S2 is 0.41, and 54.55% of the coefficients are significantly positive at the 5% level.[11] I do not want to judge if these numbers are high enough to imply irrational behavior. Rather, I consider how the results

11 Lee et al. (1991) report that average pairwise linear correlation for their sample is 0.25 for domestic funds and 0.27 for diversified domestic funds.

linear correlation

Period	\Delta HF(t)	\Delta MSCI(t)	\Delta MSCIEUR(t)	MP(t)	YP(t)	CS(t)	TS(t)
January 2005 - December 2008	-0.24	-0.44[a]	-0.47[a]	-0.58[a]	-0.53[a]	0.59[a]	0.37[a]
January 2005 - June 2008	0.23	0.03	0.06	-0.01	0.12	-0.21	-0.04

rank correlation

Period	\Delta HF(t)	\Delta MSCI(t)	\Delta MSCIEUR(t)	MP(t)	YP(t)	CS(t)	TS(t)
January 2005 - December 2008	0.11	-0.07	0.01	-0.1	-0.04	-0.17	-0.01
January 2005 - June 2008	0.16			0.07	0.02	0.09	0.17

This table shows how changes in discounts are related to changes in macroeconomic variables and overall HF performance. I briefly describe the variables: proxies the HF industry return measured as where is the value of the Credit Suisse/Tremont HF index; mimics the return of a diversified equity portfolio measured as where is the MSCI world equity index; reflects the performance of European stocks measured as where is the value of the MSCI Europe equity index; (respectively) is the monthly (respectively yearly) change in EU industrial production measured as (respectively) where is the EU industrial production; is the change in risk premia (credit spread) measured by where is the return on BBB rated corporate bonds at time and is the return on AAA long term government bonds at time is the change in the term structure (term spread) measured by where is the return on short-term government bonds for month I consider both linear and rank correlation. a/b/c implies significance at the 1%/5%/10% level.

Table 5 – Correlation between and several macroeconomic variables

change when only considering a subperiod of the whole sample. The strong increase in discounts in the second half of 2008 (Figure 1) suggests that there is a dramatic change in market appreciation of managers' abilities. I exclude this period for a second analysis, and I find that the average pairwise linear correlation decreases to 0.18. Repeating the procedure for the rank correlation I find a similar pattern. As the rank correlation is less sensitive to extreme values [Embrechts et al. (2005)], the difference is less distinctive in this case. Hence, if investors show signs of irrational behavior, it is primarily observable in the second half of 2008.

Lee et al. (1991) interpret the correlation of changes in discounts across funds as an evidence for irrational noise trader risk. They argue that noise trader risk is a new risk factor and is not associated with macroeconomic variables. To test this notion for my sample I look for possible drivers in fund discounts. Following Chen et al. (1986) I consider the following variables: industrial productions, risk-premium on bonds, and the term structure of interest rates. Additionally, I analyze how discounts are related to overall stock market returns and to the performance of the HF industry. I calculate linear correlation and rank correlation between VWD and innovations in these variables for the whole sample period from January 2005 to December 2008 and for the subperiod from January 2005 to June 2008.

The results are depicted in Table 5. For the subperiod from January 2005 to July 2008 no correlation coefficient is significantly different from zero, neither for linear nor for rank correlation. Such a pattern is what I expect from rational investors paying fees to fund managers believing that these managers have the ability to generate positive returns independent of market conditions. When considering the whole sample period, however, the results differ. While all but one coefficient are significantly different from zero at the 5% level for linear correlation, rank correlation does not report any significant comovement. To interpret this result I refer again to the sensitivity of linear correlation to outliers; that is, a small number of extreme, common observations can cause the result to change considerably. In contrast, rank correlation is more robust to extreme values. The second half of 2008 is characterized by strong changes in macroeconomic factors and in investor expectations: economic outlook worsens and discounts increase. I conclude that small changes in macroeconomic perspective do not cause investors to adapt their expectations about future managerial performance, but once the outlook becomes considerably negative (as observed in the second half of 2008) investors no longer believe that managers are able to withstand the downtrend and become pessimistic about CEHFs in general.

Concluding remarks

The present study contributes to the controversial discussion initiated by Lee et al. (1991) and Ross (2002a, b) about the interpretation of the patterns in CEF discounts. My results provide evidence in favor of the latter studies which propose that the CEF puzzle can be explained by relying on purely rational investors. Specifically, I find evidence for the notion of Ross (2002b) which states that the relationship between low CEF discounts and the start of new funds are due to the informational idiosyncrasies of the IPO process rather than investor irrationality. By considering two subsets of the whole CEHF sample I show that investors rationally exploit the available information set when deciding to engage in the IPO of a new fund, or when buying new shares issued by an existing fund.

Further, I also find that investors strongly reacted to the economic crisis in the second half of 2008. I measure the effect of this crisis by calculating the average linear and rank correlation for the whole period and by excluding the time of the crisis. I find that the correlation coefficients strongly decrease in the later case. I interpret this finding as evidence that investors react irrationally to the worsening economic conditions. Additional evidence for this interpretation is found when considering the correlation of fluctuations in discounts and changes in several macroeconomic factors. In most of the sample period the funds' discounts tend to

be unaffected by general economic influences. Such a pattern is what I expect when trading in the CEFHs shares is mainly done by rational investors. Note that HF managers justify their enormous fees by claiming that they are able to generate positive returns independent of market developments. Hence, a rational investor's expectation about the fund mangers' ability must not be affected by macroeconomic factors. But again, the investors strongly react to the worsening economic conditions in the second half of 2008.

I conclude this chapter by emphasizing again that a similar discussion is not possible with a sample of CEFs that exhibit a closely defined investment focus. The discounts of such funds are strongly affected by the investors' perception about the investment target of the funds, and therefore a strong correlation for funds with a similar focus is not to be interpreted as a sign for investor irrationality. Cherkes et al. (2005), for example, find that IPOs of closed-end mutual funds in a specific sector occur only during years in which seasoned funds in the respective sector are trading at a premium. A similar bias due to sectorial membership does not appear in the present sample of CEHFs as HFs do not exhibit a prespecified investment range.

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PART 1

Next Generation Niche Markets

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Abstract

This paper describes the development of an Internet-based financing and web business development platform. It is the first public internet supported straight-through-processing (STP) model to be described for integrating the capital raising function with the development and operation of Internet start-ups and maturing Internet businesses. The transparency demanded of secondary market traders/investors, usually afforded by audited periodic financial information and research from independent analysts, has proven highly suspect in past booms in Internet business start-up and development activities. In the past cycle and to the present, web-based, Internet-enabled businesses have been financed through conventional money raising methods and, recently, through Internet-based public auctions. The business itself was detached from the money raising function and likewise detached from secondary market trading. This paper will describe how to tightly couple the two, given that the financing of the business and the business itself can be enabled on the same information and communication technology platform. Investors/traders can view price discovery of the company's shares at the same time and, where appropriate, on the same screen as the web-enabled business. Statistics such as number of visitors, purchases made, click-through patterns, views, and other metrics of Internet businesses can sit side by side with quotes and sales of the company's shares. The real-time nature of electronically auctioned primary market fund raising, exclusively Internet-based businesses, and secondary market trading allows for complete and absolute transparency. This paper will, for the first time, describe how investors/traders can see the books and records of a business updated in real-time, observe the progress of the business evolving in real-time, and observe the price of its shares changing in real-time. A new information source, the "real-time due diligence ticker" is also described.

The business model

In the past cycle and to the present, web-based, Internet-enabled businesses have been financed through conventional money raising methods and, recently, through Internet-based public auctions. The business itself was detached from the money raising function and likewise detached from the secondary market trading. The challenge is to tightly couple the two, given that the financing of the business and the business itself can be enabled on the same information and communication technology platform. Investors/traders can view price discovery of the company's shares at the same time and, where appropriate, on the same screen as the web-enabled business.

Statistics such as number of visitors, purchases made, click-through patterns, views, and other metrics of Internet businesses, collectively referred to as due diligence data, can sit side by side with quotes and sales of the company's shares. The real-time nature of electronically auctioned primary market fund raising, exclusively Internet-based businesses, and secondary market trading allows for complete and absolute transparency, a desirable attribute for potential investors and public company shareholders. Doing so would enable investors/traders to see the books and records of a business updated in real-time, observe the progress of the business evolving in real-time, and observe the price of its shares changing in real-time.

We describe in this paper an integrated web-enabled business model that incorporates: (1) an auction process for pricing a new or follow-on issue of securities to fund either the start-up or continued operation of a web-based business; (2) the secondary market trading of publically traded shares and/or private placements of the web-based business; (3) a common set of development tools for both managing the build-out and constructing the web-based business; (4) a common platform to operate and monitor the web-based business over the Internet; (5) a common platform for performing financing and banking activities, maintaining the books and records, and auditing the web-based business; and (6) a management information system that oversees each of the web-based businesses for security, reliability, capacity and usage, and fraud monitoring and detection.

The business model is extended to support primary and secondary market functions by incorporating: (1) a common business plan and presentation framework and proposal development tool kit for preparing "offering memorandum" and road shows; (2) a common book running/syndication framework and system; (3) a market making, trading and/or automated price matching system for price dissemination and secondary market trading; and (4) a common communication platform where traders/investors can communicate with others (shareholders, potential shareholders, peers, etc.) using real-time, voice-over-Internet protocols (VOIP) and instant messaging technologies (chat rooms, blogs, broadcasts, etc.). Such communication can allow ratings/reviews of either the company or the stock itself, i.e., product/service, value of share price, etc., with all such communications being logged and accessible, thereby deterring market manipulation.

- Real-time production and distribution of data for public company due diligence.
- Contiguous and simultaneous production of above with real-time market data.
- Contiguous and simultaneous availability of real-time due diligence data for real-time IPO price discovery and transparency of public company securities.
- Contiguous and simultaneous availability of real-time due diligence data for real-time secondary market price discovery and transparency of public company securities.
- Contiguous and simultaneous availability of real-time due diligence data of public companies for real-time IPO pricing, and real-time secondary market price discovery and transparency.

Figure 1 – The integrated business and capital raising model

For the first time, a going business will produce and distribute real-time due diligence data, bringing assurances to the investor/trader that the web business owner receiving funds is tightly coupled in an STP processing model to an external, independent continuous audit function and, further, to an accounting firm to actually oversee and/or post journal entries for cash and valued collateral to each web businesses' official books and records. A bank or banks with global reach is tied into the system electronically in the same STP model and a local audit/account partner must be a dual signer to allow the web business owners access to funds so that financial fraud is mitigated.

Finally, the software platform, communications infrastructure, power grid, and any call center facility, etc. must be accommodating of a 24/7, high availability, secure facility that supports both function-rich websites and the mechanisms to accept payments for product and service purchases, and/or marketing activity for advertisers, as well as supports a secure, well-regulated primary and secondary market issuance and trading structure.

Background

Internet pioneers E*Trade and Wit Capital, along with traditional investment bankers turned e-commerce entrepreneurs, created a more even playing field for the individual investor in garnering a fairer share of IPOs back in the late 1990s at the dawn of the Internet age when a research and defense network established by the U.S. Government was turned over to commercial interests. Wit Capital began offering IPOs to their Internet clients by placing an offering document on the newly developing Internet in 1995. Its intention at that time was to solicit interest in the sale of shares in its own company, Spring Street Brewing. At that time, Wit was the brand name of the beer brewed by Spring Street Brewing Company. Being the first to present a public offering document over the Internet, the company

soon attracted media attention and a host of investors. This early success spurred the founder of the brewery to quickly realize the benefit of underwriting other companies' issues for promotion over the Internet. Wit Capital eventually participated with traditional underwriters and received a portion of the allocation for distribution to its clients, which had mainly been attracted to Wit through its early Internet presence.

Another group, E*Offering, a venture of E*Trade, and investment bankers Sanford Robinson and Walter Cruttenden, attempted to distribute 50% of an IPO to the individual investors that came through E*Trade's online brokerage service. They expected that online road shows and prospectuses would lower the distribution cost eventually from the then current standard of 7% to 4%. Fast forward to today where, in the U.S., fees to take a company public have stayed at an average 6.7% of the proceeds of the offer. This compares with banks in Europe, which bill their clients an average of 3.2%, and Asia, where underwriters typically pocket about 2.5% of the proceeds.

Their approach did not attempt to solve the problem of the mispricing of new issues where the price of the stock on the first and subsequent days of secondary market trading reached unprecedented heights. This simply allowed E*Trade clients, like Wit Capital clients, to become part of the privileged few that enjoyed the benefits of the large run-ups in the early days of secondary market trading in those mispriced issues.

Another venture, that of William Hambrecht's W. R. Hambrecht & Co., set IPO prices and allocation of IPOs online through an auctioning process known as a Dutch auction. This facility, known as OPENIPO, allowed bidders to open brokerage accounts with W.R. Hambrecht & Co. or the other brokerage firms participating. Bids were taken for the number of shares wanted and at the price the bidder was willing to pay. After a few weeks of accepting bids, the offering price was set at the lowest price at which all shares could be sold, known as the clearing price. Those who bid above the offering price would get all the shares they asked for at the offering price, while those bidding at the offering price would get some portion of their shares, and those bidding below would not receive any shares. No single bidder could receive more than 10% of the offering and the underwriter would reserve the right to limit the maximum amount to as little as 1% per shareholder. This last approach represents a real solution for IPO mispricing by making it possible to allow all available demand into a primary market "auction" and, thus, be able to set the most balanced initial public offering price.

The most memorable IPO auctioned in this way was that of Google, itself a web-based business model, in 2004. Notwithstanding the improved access afforded to bidders, the offering still fell short of accommodating all the demand in the market, as witnessed by the subsequent day's secondary market trading which saw a further run up in Google's stock price. The logic behind such an approach is that it would allow all investors to bid for Google's shares directly, rather than leave it to an investment bank to decide on the price of the shares and who should receive them – usually their biggest institutional clients. It also reduces the amount of underwriting fees, which, in theory, should ensure the company gets a larger share of the proceeds of an IPO. Critics, however, warned that an auction could risk setting an unrealistically high price for Google's shares since there would not be enough stock available to meet the massive demand from private investors captivated by the prospect of a new dot-com gold rush.

Google's IPO technique flopped and it underpriced the shares. Bankers drummed home the message that money saved in underwriting fees was dwarfed by the amount Google left on the table through the underpricing.

It is a painful argument to swallow, especially given the behavior of banks during the dot-com boom of 1998-2000. Back then, critics accused them of underpricing IPOs – discounting the share price on the day of the offering – to curry favor with the institutional buyers, effectively failing to maximize profits and leaving money on the table. An estimate of an aggregate of U.S.$62 billion was left on the table in U.S. IPOs carried out between 1999 and 2000.

At its peak, about 250 companies went public in 2000 in the U.S., a number that plummeted when the dot-com bubble burst, before crawling back to 75 IPOs in 2007. The economic downturn made it even worse, with no U.S. venture capital-backed company going public for six months until April 2009, when Bridgepoint Education Inc. made its debut. The online auction process was similar in concept to what the Tokyo Stock Exchange (TSE) had been doing since 1993, which was abandoned after the Internet bubble affectively ended the plethora of new issuances. The TSE used an auctioning procedure for approximately 50% of the offered shares. Under their procedures, an investor who bid highest would receive their shares at their bid price; the next highest bidder would receive their shares at their bid price, etc. This "price discriminatory" auction continued in this way until all shares allocated to the bidding process were priced. Thereafter, the weighted average bid price was used to set the offering price of the remaining shares unallocated to the auction process.

By limiting the offering bids to 5,000 shares per order, both in the auction and in the subsequent allocation, the IPO was widely distributed. Also, results have shown that in the initial early days of trading returns fell from an average of a 70% rise prior to the installation of this new auction procedure to approximately 12%. The TSE had modified their procedures to allow both traditional underwritings as well as auctions, with the issuer able to choose between the two. At the end of the experiment, half of the TSE's IPOs were auctioned and half were done through traditional underwritings.

Angelsoft (www.angelsoft.net) Angelsoft provides web-based deal-flow and portfolio management tools for finding, accepting, tracking, and collaborating on early stage investments for use between entrepreneurs, angel investors, and venture capitalists. Angelsoft lets investors accept new deal opportunities and track them over the web, by email or through a customizable application process integrated into a client's own website. It provides a secure platform and reporting mechanism to collaborate among investors and includes message boards, document management, event management, and deal access control for every deal "room." Entrepreneurs can post business plans in online deal rooms, develop pitches and secure online deal processing systems through which investors collaborate to review business opportunities using the latest due diligence technologies. It then connects them, ties them directly into the world's leading organizations of professional investment funds, and supports them with the participation of top tier venture law firms, business schools, and investment conferences.

By providing one platform that connects everyone in the early stage investment world, they bring transparency to early stage investing. Entrepreneurs can view real-time statistics on potential investors. Investors can find experts in specific industries and give a pitch a thumbs-up or thumbs-down. Additional premium features include searchable databases, promotional opportunities, and investment support services. It claims to have over 19,000 early stage investors managing their investments through over 450 venture funds and angel groups from 45 countries collaborating on thousands of new funding applications each month.

InTrade (http://www.intrade.com/) – InTrade (U.S.A.) is a division of the Minneapolis Grain Exchange, which confers on InTrade regulated exchange status under the CFTC. Their trading service allows members to transact trades on political, financial, current, and similar event futures. InTrade provides the platform whereby members can trade between themselves. InTrade ensures that trading profits and losses are transferred between customers in a timely manner and allows customers to close out positions by trading with any other customer. InTrade has been developed around a combined exchange and clearing house model. There is no charge for entering an order; there is only a commission when a matched trade occurs.

The market data that is produced from this trading is used by people who want to acquire the predictive intelligence from the InTrade marketplace. They include governments, global media organizations, central banks, investment houses, universities, the military, private traders, consultancies, and public individuals. For example InTrade supplies market data to CNBC, CNN, FOX, WSJ, FT, New York Times, a number of Federal Reserve Districts, major universities and graduate schools in the U.S., the ECB, Cato, Bank of Japan, Bank of England, presidential candidates, and major and boutique Wall Street firms. They operate public and private prediction market places for Yahoo!, The Financial Times, the National Journal, RealClearPolitics, and Rasmussen Reports. These marketplaces increase page views, editorial content, community, user "stickiness," average time on a site and therefore increase advertising revenue.

Prosper (http://www.prosper.com/legal/compliance.aspx) – The Prosper marketplace is a peer-to-peer online credit auction platform operated by Prosper Marketplace Inc. ("Prosper"), a registered financial company. Prosper handles the registration of borrowers, lenders, loan sellers, and group leaders; the receipt, display, and matching of listings and bids on listings; the issuance and sale of Borrower Payment Dependent Notes to lender members; and the origination, servicing, and collection of principal, interest, and other charges payable on loans. Lender members may offer their Notes for sale to other lender members through the Folio Investing Note Trader platform operated and maintained by FOLIOfn Investments Inc., a registered broker-dealer.

Borrower members can post listings on the platform to request and obtain loans. Lender members can bid on listings and purchase Notes from Prospers that are dependent for payment on payments received on the corresponding borrower loans described in the listing. Group leader members can form groups of borrowers with common interests.

All loans originated through the platform are made by WebBank, a Utah chartered Industrial Bank and sold and assigned to Prosper. Prosper provides services to WebBank in connection with the origination of these loans. Prosper services all loans made to borrowers on behalf of lender members who purchase Notes. The payments of the Notes are dependent on the cash flow from the loans. All borrower loans are fixed-rate, unsecured, 3-year, fully amortizing with simple interest. All loans are obligations of individual borrowers and not of corporations or businesses. A borrower who obtains a loan to be used for business purposes is personally obligated to repay the loan, regardless of the success or failure of the business for which the loan may be used.

SecondMarket (http://www.secondmarket.com/) – SecondMarket bills itself as the largest centralized marketplace and auction platform for illiquid assets, such as auction-rate securities, bankruptcy claims, collateralized debt obligations, limited partnership interests, private company stock, residential and commercial mortgage-backed securities, restricted securities, and block trades in public companies and whole loans. SecondMarket's online auction platform claims over 5,000 participants, including global financial institutions, hedge funds, private equity firms, mutual funds, corporations, and other institutional and accredited investors that collectively manage over U.S.$1 trillion in assets available for investment. Their hybrid transaction model uses technology and sales and trading professionals to offer liquidity in illiquid markets. Their online trading platform provides a centralized location to bring buyers and sellers together and provide transparency and offer a variety of auction formats including English auctions, Dutch auctions, sealed bid auctions, reverse auctions, and SecondMarket's patent pending ManhattanAuctions. Further, their trading platform utilizes a proprietary matching algorithm to pair buyers and sellers. SecondMarket facilitates all administrative and settlement support services for executing both private and public transactions involving illiquid assets. They manage the entire process, from pre-sale due diligence through execution and settlement.

Kiva (http://www.kiva.org/about/how/) – Lenders browse profiles of entrepreneurs in need and choose someone to lend to. When they lend, using PayPal or their credit cards, Kiva collects the funds and then passes them along to one of their microfinance partners worldwide. Kiva's microfinance partners distribute the loan funds to the selected entrepreneur. Their partners also provide training and other assistance to maximize the entrepreneur's chances of success.

The Receivables Exchange (www.ReceivablesXchange.com) – The Receivables Exchange claims to be the world's first online market place for real-time trading of commercial accounts receivable. It provides small business financing for working capital management. The Exchange connects a global network of accredited investors (buyers) to the U.S.'s three million small and mid-sized businesses (sellers) in search of capital to grow their businesses. Buyers get direct access to an U.S.$18 trillion new investable asset; small businesses get to access a new competitive working capital management solution by having their receivables bid on by multiple buyers in real-time.

UnifiedMarkets (UM) (http://www.unifiedmarkets.com/) – UM offers global access to financial and business information and access to worldwide listings of service providers, including securities settlement and trust service operators. Indications of Interest (IOI) to buy and sell an unprecedented range of assets are posted by members on UM including all types and classes of securities, businesses, business assets, business loans, and joint ventures. UM member services include links to independent, broker-operated on-line trading systems that accept firm buy and sell quotes and provide securities auction services. UM is an Internet-based, 24/7 worldwide network. The search engine locates UM member IOI postings of financial instruments, businesses, business assets, and other assets that are of interest. UM members post IOI for purchase and sale of unregistered and registered financial instruments, businesses, and business assets. Members may limit the scope of IOI distribution and search access to only other members who meet certain qualifications specified by them. Members may further target or restrict their IOI distribution and search to pre-designated affinity groups. The online confidential and encrypted discussion groups that are supported for anonymous meetings, discussions, and negotiations are deleted from the UM databases following conclusion of discussions. There is no investment advice provided by UM to members, UM members do not effect transactions on UM and members are advised to use licensed agents of their choice for transaction settlements.

Figure 2 – Niche market examples

The Tel Aviv Stock Exchange, after installing a new electronic trading system, had also adopted an auction procedure for IPOs, known as a Uniform Price Auction, similar to the Dutch auction of W.H. Hambrecht. These auctions resemble the auctions conducted by the U.S. Treasury, where U.S. Treasury securities are issued.

Today, the Internet provides access to a wider distribution base, making broad primary electronic offerings possible. An electronic primary auction process in an integrated system with a secondary market trading method and a transparent Internet operating, marketing, and financial business model (collectively, the STP process described in this business model) is a logical extension of systems and communications capabilities coupled with a web community of informed investors.

Other business models

Other models for Internet-based capital raising, trading, and fulfillment exist, some of which are described below. While there are many variations of this proposed business model, some going back to the beginnings of electronic market trading systems, from the early days of Instinet and CATS to the automated contract markets of Intex and Globex, none integrated an initial offering (IPO) process to finance any start-up or secondary offering. None anticipated a niche market with web-based businesses. Also, there was no attempt to create real-time due diligence data to observe the ongoing operations, marketing or financial activities of a business now made possible by web-based businesses.

None of the existing or proposed business models have integrated the business of the underlying financed company into the exchange systems platform, nor an ability to view both IPO financing and secondary market trading at the same time as viewing real-time due diligence within a web-based business model on the same platform.

Description of the web-enabled market and business model (WMBM)

A business entrepreneur will either present an idea, a business plan, a prototype of a web-based business, or a partial or fully functioning web-based business. The initial process of the WMBM described below requires an evaluation of the business model and, if judged acceptable based upon the WMBM's own business criteria, will prepare the necessary materials (presentations, pitch book, business plans, etc.) for its financing through its advanced web-based business tools. Based upon the web-based platform(s), tools, and vendor applications imbedded in the prototype or the partial or fully functioning web-based business, a plan to transfer, convert, and/or build features and functions into or for the business will be undertaken.

As with all new issues, an issuing company would proceed to prepare an offering document with all the traditional financial measures, valuation procedures, and public filings. The shares would be posted for offering on an electronic "book" that supports the issuance method of the WMBM. In this instance, the book would simply be used to store and price new issues rather than already issued securities – conceptually a new application of the existing mechanism for the opening of the day's trading for already issued securities on existing exchanges. Prior to placing an anonymous bid, the bidder would access company and due diligence information via the Internet, placed there by the sponsoring broker under the WMBM and by the issuing company through its designated website.

Traditional brokerage firms, along with Internet-based and other online brokerages, would provide electronic interfaces between the customer orders coming into it and the orders being placed on the system of the WMBM for the initial offering of the company's shares. Following the acceptance of an order, an account would be opened pending the receipt of funds. For existing account holders, sufficient funds would be checked prior to accepting an order and segregated for placement on the exchange.

The auction process would be programmed to proceed in any of a number of ways described earlier in a number of auction processes: Dutch auction, English auction, sealed bid, reverse auction, Vickery auction, etc. The offering can be updated to reflect the demand by either making more shares available (as is common with "shelf registrations" in the U.S.) and/or keeping the shares at the initial number while accepting only the highest priced bids until all demand is satisfied. The amount thus raised would be transferred to the company issuing the shares and the official start of secondary trading would commence.

The opening trade price would be determined through first accepting and then matching bid and offer prices and size until an equilibrium price is determined from which all at-opening orders would be filled. These prices would be disseminated through the WMBM and through commercial market data vendors, which would then proceed in a more orderly

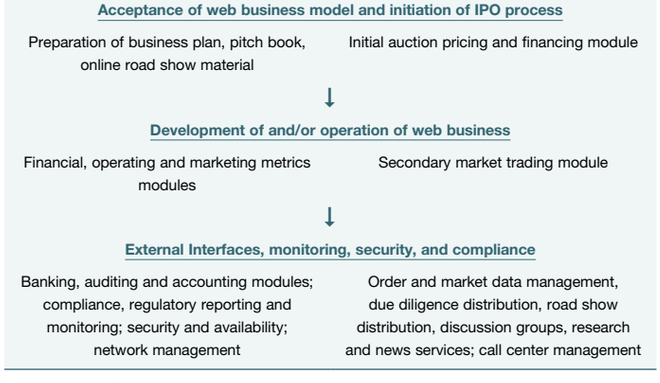

Figure 3 – Overview of web-enabled market and business model

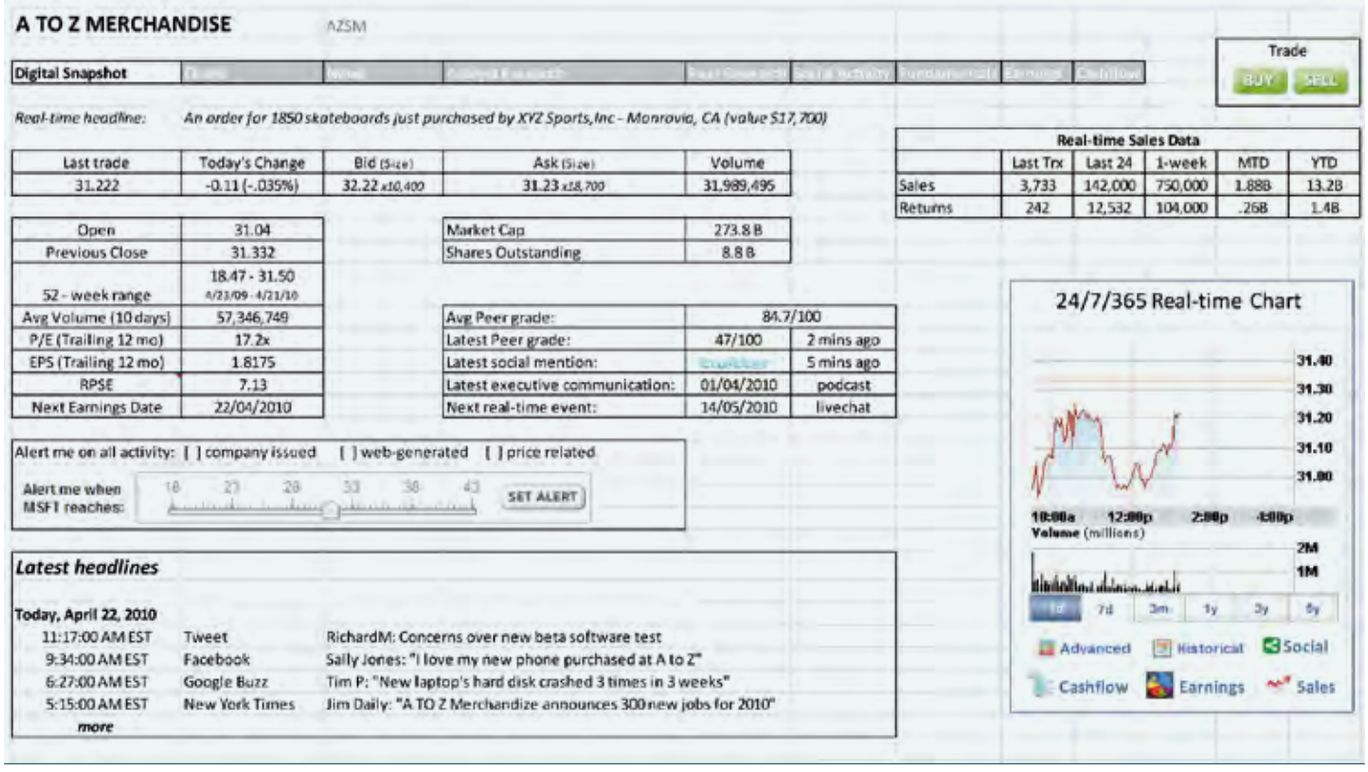

Figure 4 – Dashboard display for observing the integration of real-time due diligence with real time price discovery and transparency

fashion, moving up or down as bids at a certain price seek offers at or near the same price, somewhat tied to the perceived fortunes of the company. The fortunes of the company would be observable through the transparent nature of the operations, financial activities, and marketing metrics available on the system.

The web-based business will be integrated into the above financing function and secondary market trading functions such that the businesses' operating, marketing, and financial metrics will be transparent and observable on the integrated platform

Measures for assuring that no information leakage occurs, such as insider trading; or financial leakage, such as theft of financial assets; or fraud occurs will be integrated into the platform and closely monitored. For example, the web business owner receiving funds must use the WMBM's method of approved local audit/account partner as a dual signatory. All fund movements are tightly coupled by a systematized, external, independent, and continuous audit function and an accounting firm to actually oversee and/or post journal entries for cash and valued collateral to each web businesses' official books and records for those that do not come from electronic payment and/or inventory management systems. A bank(s) with global reach is tied into the system electronically so that financial fraud is mitigated.

Conclusion

The web-enabled market and business model suggested in this paper will help entrepreneurs, as well as established corporations, to find a new shareholder class on the Internet. Not only a class of shareholder that comes to appreciate a new web-based business, but also those who shop or use services of the internet businesses of established corporations. In an earlier era of Internet start-ups such companies were spun off, in an accounting sense, from the parent and offered to a new investing group as a new share offering called a tracking stock. The model described in this paper will assist both start-ups and fully formed companies in the coming era of web-enabled businesses to reach a new shareholder class, the internet consumer of digital services.

Peter Lynch, the legendary portfolio manager of Fidelity's Magellan fund, was fond of advising individuals to buy stocks of companies that they frequent as a consumer. Our advice is similar: buy the stocks of those web-enabled businesses that you frequent, and also buy these stocks where you shop – on the Internet!

Global Financial Centers – Growth and Competition after the Crisis

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Abstract

International competition between financial centers is fierce, and the financial crisis is set to accelerate the pace of change. U.S. and E.U. financial markets continue to provide around three-quarters of global financial services, albeit, after the crisis, at substantially lower overall levels of market activity in many market segments. Emerging financial markets, especially in Asia, have grown strongly in past years and are expected to continue on this path going forward. Emerging financial centers such as Beijing, Seoul, Shenzhen, Shanghai, and Dubai have improved their global rankings strongly since 2007, raising their competitiveness ratings by 42% for Seoul, 27% for Beijing, 22% for Mumbai, and 16% for Shanghai. Going forward, four drivers of financial center competitiveness after the crisis can be identified: 1. Big is beautiful – and will remain so. London, New York, Hong Kong, and Singapore are set to remain strongholds of global finance after the crisis, building on existing market strength and favorable economic conditions. 2. There is a trend towards a multipolar financial industry. In the long run, emerging financial centers are likely to succeed in establishing the scale and scope in their market environments that will help them advance into the top group of global locations. The crisis may accelerate this trend. 3. National focus will serve as transitory advantage for smaller centers. Local and regional financial marketplaces may hope for continued relevance owing to the refocusing of market participants and policymakers on their national markets. However, this tailwind will likely be of limited duration. 4. Good regulation will be a competitive advantage. Providing a good regulatory framework will be a key determinant of competitiveness going forward. Financial centers not compliant with international rules are faced with increasing political pressure and stigmatization.

Financial centers are not easily shaken. They develop over long cycles. Even when financial markets turn nervous or economic conditions sour, the pivotal role of financial centers for their business environment mostly remains intact. Key financial centers around the world have grown substantially over the past decades, supporting and benefitting from the development of the surrounding economies at the same time. The share in value added in the home economies has increased significantly in most advanced and emerging markets.

After an event of the magnitude and intensity of the recent financial crisis, however, it is worthwhile examining its potential impact on the structures and business prospects of the major financial centers around the world, and assessing their likely course of development in future. Clearly, the performance of financial centers represents a vital part of the business conditions in which companies across all industries operate, and it therefore carries wider implications for other sectors, employment, and the economy. Although the final impact of the crisis on financial centers will only be observable at a later stage, this article reviews the current state of development of key advanced and emerging financial centers and identifies drivers of competitiveness for the coming years.

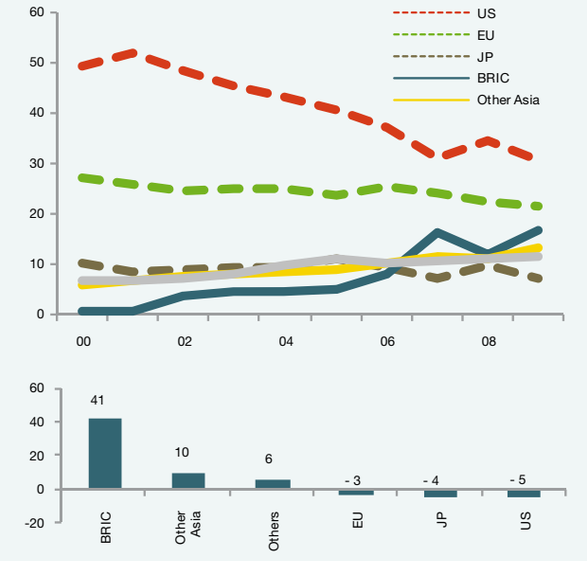
Global landscape of financial centers after the crisis

The financial crisis, despite its impact especially in the U.S. and Europe, has not immediately led to a critical change in the tectonics among the major financial centers around the globe so far. The traditional financial centers in the U.S. and the E.U. have managed to retain their strong dominance and continue to provide around three-quarters of global financial services, even if at substantially lower overall levels of market activity in many market segments.

Banking – well over two-thirds of global banking assets remain concentrated in financial centers in the U.S. and the E.U. [Transatlantic Business Dialogue (2010)]. Together, they capture more than three-quarters of the global revenue pool of investment banking services [International Financial Services (2010)].

Stock markets – at almost two-thirds of global stock market capitalization, the share of the traditional stock exchanges in the U.S., the E.U., Japan, Hong Kong, and Singapore remains dominant, albeit considerably lower than their 90% peak in 2000.[1] Their 79% share in global equity trading, however, documents their strong position as the key equity trading centers worldwide.[2] Moreover, U.S. and E.U. equity-linked derivatives make up more than three-quarters of the global outstanding [Transatlantic Business Dialogue (2010)].

Debt instruments – more than 70% of all private and public debt securities and almost 80% of all interest-rate derivatives outstanding are registered in the traditional financial centers in the U.S. and the E.U. [Transatlantic Business Dialogue (2010)]. Almost three-quarters of all new international debt securities are issued in New York or the major financial centers in Europe.[3]



Note: Share of market capitalization of domestic listed companies, % of global total, and CAGR 00-10
Sources: World Federation of Exchanges, DB Research

Figure 1 – Decline of traditional stock markets

Foreign exchange – foreign exchange trading remains highly concentrated in London and Chicago, with the U.K. and the U.S. capturing a combined 50% share in global trading. 70% of all foreign exchange derivatives transactions are undertaken in the U.S and the E.U. [Transatlantic Business Dialogue (2010)].

These impressive figures, however, cannot belie the fact that the historic position of the traditional financial centers in Europe and America is increasingly being challenged by emerging competitors.[4] Equity markets are an illustrative and in large parts representative example: the transatlantic share in global stock market capitalization has declined substantially from its 78% peak in 2001 to just over 50% today, while their share in stock trading has fallen from 86% to just over 70% in the same period.[5]

1 World Federation of Exchanges and own calculations.
2 Ibid.
3 Bank for International Settlements and own calculations.
4 For a detailed analysis of the role of U.S. and EU financial markets in the world economy see Kern (2008), also TABD (2010).
5 World Federation of Exchanges and own calculations.

1 to 20	21 to 40
London	Melbourne
New York	Montreal
Hong Kong	Cayman
Singapore	Edinburgh
Tokyo	Seoul
Chicago	Dublin
Zurich	Hamilton
Geneva	Amsterdam
Sydney	Stockholm
Shanghai	Brussels
Toronto	Copenhagen
Frankfurt	Vienna
Boston	Wellington
Beijing	Madrid
San Francisco	Oslo
Washington	Milan
Luxembourg	Rome
Paris	Helsinki
Vancouver	Mumbai
Dubai	Prague

Note: Top-40 ranking of financial centers according to GFCI.
Sources: City of London, DB Research

Figure 2 – Ranking of top financial centers worldwide

Strikingly, the growth of stock markets in the BRIC countries amount to more than 40% per year, while the E.U. and U.S. markets actually contracted.[6] Likewise, the share of the BRIC countries in the number of listed companies worldwide has jumped from just over 2% in 2000 to 22% today.[7] More than half of the world's IPOs in 2009 were listed in China alone[8] [Kern (2009)]. Similarly, Asia's share in the investment banking revenue pool has risen from 13% in 2000 to more than 20% in 2009 [International Financial Services (2010)].

In light of these long-term trends, it is evident that traditional financial centers, including New York, London, Paris, Zurich, but also Hong Kong and Singapore are facing heightening pressure to maintain their roles.

Financial center competition

The competitive position of the major financial centers around the world mirrors these trends. Traditional financial centers have grown to strength over decades and are repeatedly found to rank top in terms of international competitiveness. A typical top-10 ranking of financial center competitiveness includes London, New York, Hong Kong, Singapore, Tokyo, Chicago, Zurich, and Geneva among the front-runners.[9] Other financial centers in the advanced economies such as Sydney, Toronto, Frankfurt, Boston, San Francisco, Washington, Luxembourg, Paris, or Vancouver consistently rank among the top-25.

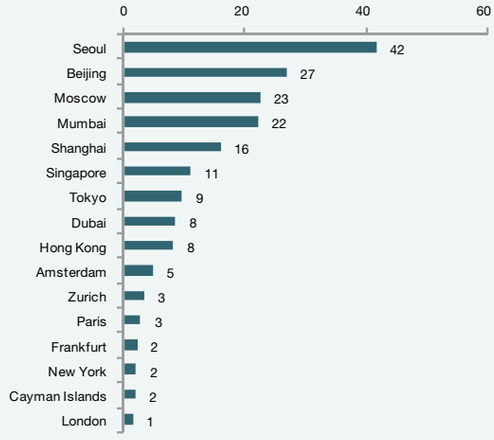
Neither the ranking nor the competitiveness rating of these centers has changed significantly over the past years. Marginal changes aside, the composition of top league tables has been comparatively static, while improvements in their ratings – at between 1% and 3% for London, New York, Frankfurt, and Paris between 2007 and 2010 – have been marginal.

What may be described as continuity in the performance of these financial centers contrasts sharply with the rise of emerging financial markets. Emerging financial centers such as Beijing, Seoul, Shenzhen, Shanghai, and Dubai have improved their global ranking strongly since early 2007, jumping 20, 17, 14, 13, and 4 places up the global league table[10], respectively. Even more impressively, the competitiveness rating of these financial centers has progressed dramatically, rising by 42% for Seoul, 27% for Beijing, 22% for Mumbai, and 16% for Shanghai.

These and other emerging financial centers have succeeded in exploiting the catch-up process to the traditional trading centers. Accordingly, the improvement in competitiveness ratings between 2007 and 2010 are closely correlated with the initial ranking of the centers.[11]

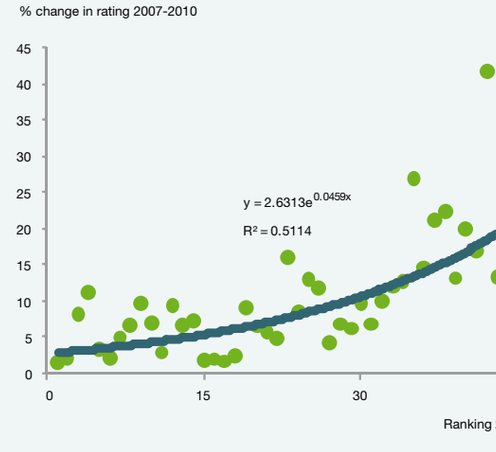
Financial centers have been categorized to capture their development. Most analyses differentiate the geographic reach of individual centers as well as level of maturity that they have reached. At one extreme, mature financial centers with a global dimension are found to include Chicago, Frankfurt, Hong Kong, London, New York, Singapore, Toronto, and Zurich. At the other end of the scale cities such as Budapest, Istanbul, or Riyadh are considered to be local in scope and at an early stage of their development as broad and deep financial markets. In between, a broad variety of combinations of geographic reach – from local to transnational and global – and degree of development – from emerging to mature – have been identified. Much of the dynamism in competitiveness rankings and ratings discussed here can so far be observed in the lower and middle ranges of the league tables.

6 Ibid.
7 Ibid.
8 Figure includes Hong Kong SAR. International Financial Services (2010), p. 8.
9 City of London (2010), p. 28. The ranking reproduced here is the City of London's Global Financial Centers Index (GFCI), published bi-annually since 2007, and ranking 75 financial centers around the globe on the basis of indicators for availability of human resources, business environment, market access, infrastructure, general competitiveness, and assessments by market participants. The relevant data in this article are taken from Global Financial Centers 7 of March 2010. The September 2010 edition of the GFCI confirms the conclusions of this article. Alternative approaches include, the World Economic Forum's Global Competitiveness Report, in which measures for financial market development, financing through local equity markets, ease of access to loans, venture capital availability, restrictions on capital flows, strength of investor protection, soundness of banks, regulation of securities exchanges, and legal rights are summarized to obtain an index for financial market sophistication for 133 countries. Financial centers are not analyzed individually. See World Economic Forum (2010), p. 337 ff.
10 City of London (2010), p. 28. Changes in ranking adjusted for new entries and drop-outs.
11 The close correlation exists for the percentage change in GFCI rating points between 2007 and 2010 and the ranking of financial centers in 2007 (r=0.71).



Note: Change in competitiveness index between 2007 and 2010, % change of GFCI ranking for selected centers
Sources: City of London, DB Research

Figure 3 – Emerging financial centers enhance competitiveness



Note: GFCI financial centers ranking 2007 and subsequent % change in competitiveness rating 2007 against 2010.
Exponential trend. Sources: City of London, DB Research

Figure 4 – Catch-up process of emerging financial centers

However, it is worthwhile noting three important caveats. First, as much as they still dominate, the top ranks in competitiveness league tables are no longer the prerogative of traditional financial centers. Most importantly, Shanghai, Beijing, and Dubai have successfully advanced to the top group of competitive financial centers even if in terms of market size and maturity they still belong to the emerging centers.

Second, European financial market places are on the whole falling behind in the rankings. Thus, cities such as London, Paris, Madrid, Milan, Frankfurt, and Amsterdam have clearly lost grounds compared to other advanced and emerging locations, and, in particular, seem to be missing opportunities of enhancing their competitiveness.

Finally, empirical assessments of financial sector competitiveness have yielded varying and at times contradicting results.[12] Depending on the criteria applied when measuring competitiveness, market maturity, sophistication, or other indicators, financial centers can exhibit very different stages of development.

Despite the significant variations in classifying financial centers, there is broad agreement on the factors that explain the emergence and development of financial markets, and that can help promote the competitiveness of individual financial centers. At a more general level, financial markets develop along real economic needs, with the financing of trade and commerce, the mobilization of capital in light of economic competition, or the protection of assets in unstable economic environments as basic fundamental motivations [Arner (2008)]. On the basis of these needs, financial center development benefits if a number of conditions are met which facilitate the emergence of a network-type market place. These basic conditions[13] include:

- Innovative and competitive financial intermediaries.
- Solid market infrastructure for communication and financial transactions.
- Widely available information.
- Free capital flows and open access to domestic and international markets
- Access to related professional services.
- Qualified human resources.
- Sound monetary and exchange rate framework.
- Stable political institutions.
- Rule of law and calculable business environment.
- Efficient regulatory and supervisory arrangements.
- Friendly tax environment.
- Quality of life.

In combination, economic and business needs as well as these conditions for financial developments greatly influence the success of financial centers, with a wide range of possible outcomes for individual market places. In practice, the key question is, how these factors combine and

12 The indicator for financial market sophistication in the World Economic Forum's Global Competitiveness Report, for example, produces a very different ranking of financial markets and their centers, among other things ranking the U.S., the U.K., and a number of European financial markets below countries such as India and Montenegro in terms of sophistication [World Economic Forum (2009)].

13 Arner (2008), pp. 196-200. The importance of individual conditions varies along the state of development of individual financial markets and centers.

to what extent they – together with other decisive external forces – produce patterns in financial market development which influence the overall landscape of financial centers around the globe.

Drivers of competitiveness after the crisis

The financial crisis marks an important caesura in the development of financial markets. Key segments of the markets declined or dried out temporarily. Significant market participants were weakened or disappeared altogether from the marketplace. Policymakers are working on reforming the regulatory and supervisory framework of financial markets. All of these factors influence the competitiveness of financial centers.

The final impact of the crisis remains uncertain, to be sure. The development in recent months suggests that financial markets may recover relatively swiftly from the severe turmoil of the years 2007 through 2009. Equity markets are recuperating from their lows, and the capital basis and profitability of key international banks has improved. Overall, market volumes in important segments have reached levels by mid-2010 comparable to those before the crisis or even higher.[14] At the same time, it is unclear whether this recovery marks the overcoming of the crisis, or whether further set-backs have to be expected in coming years.

In light of these uncertainties, the question arises as to what will be the factors driving financial center competitiveness and to what extent long-standing trends may be influenced by the repercussions of the crisis. Four major drivers can be identified.

Big is beautiful – and remains so

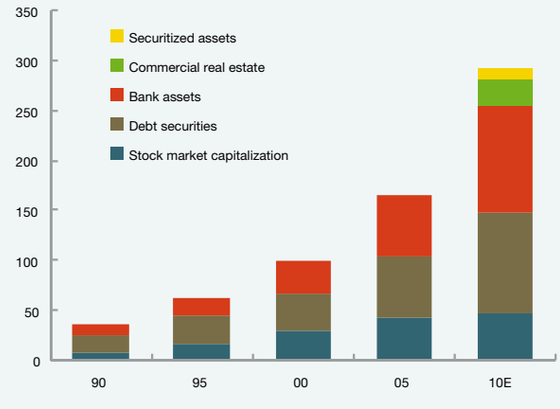
The world's traditional global financial centers – London, New York, Hong Kong, and Singapore – are set to remain strongholds of global finance after the crisis. Financial market activity flourishes where economic activity thrives. Historically, financial centers have prospered in or near strong economies, such as the U.S., Europe, or Asia, and their major commercial trading venues. Theoretical approaches to the location, distribution, and size of financial centers have repeatedly underlined the central importance of their relevance for and proximity to real economic activity as the most important determinant of their development [Jarvis (2009); Arner (2008)]. The financial crisis has neither altered the primary relationship between the financial centers and their surrounding economies, nor has it fundamentally changed the economic capabilities of the major economies in the world. The basic logic of financial centers servicing economic markets therefore remains untouched by the crisis.

London, New York, Hong Kong, and Singapore continue to benefit from their traditional weight in global finance. A large share of global financial services is generated in these hubs. In particular, the vast majority of investment banking services originate here. Thus, almost three-quarters of all equity trading is undertaken through their stock exchanges, even

Top-20 performers		Bottom-20 performers	
Seoul	42	Geneva	6.8
Beijing	27	Helsinki	6.7
Moscow	23	Stockholm	6.6
Mumbai	22	Chicago	6.6
Athens	22	San Francisco	6.5
Rome	21	Montreal	6.4
Prague	20	Milan	6.0
Lisbon	17	Dublin	5.7
Shanghai	16	Sydney	4.9
Wellington	15	Amsterdam	4.7
Budapest	13	Madrid	4.1
Warsaw	13	Zurich	3.2
Luxembourg	13	Paris	2.7
Vienna	13	Melbourne	2.3
Copenhagen	12	Frankfurt	2.0
Vancouver	12	New York	2.0
Singapore	11	Cayman	1.8
Oslo	10	Edinburgh	1.7
Tokyo	9	Hamilton	1.5
Brussels	9	London	1.3

Note: Top-20 and bottom-20 performers in GFCI competitiveness rating progress, % change in ratings between 2007 and 2010
Sources: City of London, DB Research

Figure 5 – Top and bottom performers in competitiveness rating



Stock market capitalization worldwide, total assets of world's 1,000 largest banks, volumes of debt securities outstanding, invested and investible commercial real estate assets (from 07 onwards) securitised assets outstanding (from 07 onwards), all USD.
Sources: DB Research, various public sources

Figure 6 – Growth of global financial markets

14 Recovery has not been achieved in segments that were hit particularly hard, including asset-backed securities, mortgage-backed securities, or commercial paper.

though companies listed in these locations make up less than one-quarter of the global total.

These centers enjoy historically grown and economically founded advantages of concentration and agglomeration. These include greater market liquidity, positive network effects, strong and stable market infrastructure, and better and more professional crisis management by regulators and supervisors. More liquid and mature markets and regulatory system are key advantages for market participants, especially in light of the difficulties encountered during the crisis. Not surprisingly, the weight of the big four hubs in equity trading has not only gradually increased from 40% to 60% between 1990 and 2007. It actually jumped up to more than 70% during the peak of the financial crisis, reflecting the flight for liquidity and quality in times of distress.

For emerging financial centers, categories such as market liquidity, market infrastructure, and sound regulation and supervision are particularly cumbersome to catch up with. Either they depend on the long-term development of markets and cannot be bought to start with or are very costly to build up. This makes the large financial players more difficult to challenge.

For the time being, therefore, the position of the traditional large financial centers remains strong. Depending on the future development, they may in fact enhance their position further, building on their strengths in terms of market liquidity and solid policy frameworks.

Towards a multi-polar financial industry

In the long-run, emerging financial centers, especially in Asia, are likely to succeed in establishing the scale and scope in their market environment that will help them advance into the top group of global locations. In doing so they will continue along a trend of substantive market growth and enhancing competitiveness that locations in Asia and the Gulf region had embarked upon in the 1990s.

Importantly, the crisis may in fact accelerate these trends. As the share of emerging markets in the global economy rises, their potential as financial markets grows along. This progress is well under way and well documented. The combined U.S. and E.U. share in world GDP fell from two-thirds in the 1990s to just about 50% in 2009. Conversely, the share of important emerging markets such as China, India, Brazil, Russia, and the Gulf region, has grown rapidly over the past decade. The underlying lead in growth rates is set to widen in future, with developing Asia projected to continue growing above 8% per year in the medium term, the Middle East at close to 5%, and Latin America at 4%, whereas the advanced economies may hardly surpass the 2% threshold [IMF (2010)].

This dynamism points at strong financing needs in the years to come, as, for example, new gross fixed capital formation in the emerging Asian economies is expected to grow around or above 5% in the coming years [IMF (2010)]. At the same time, financial flows from the advanced to the emerging economies are expected to stay behind the levels seen in the past [IMF (2010)], suggesting that much of the financing needs in the coming years will need to be satisfied by domestic emerging financial markets.

The dynamism is also a significant source of new wealth accumulation in many emerging economies. Thus, the population of high net worth individuals in the Asia-Pacific region held almost U.S.$10 trillion worth of assets in 2009, for the first time in history surpassing Europe in volumes and numbers [Cap Gemini (2010)]. The number of and assets of the middle classes in emerging economies in Asia and the Americas, too, has been rising considerably [Saxena (2010)]. In addition, to these private assets, many emerging economies have built up sizeable funds to manage sovereign wealth whose assets under management in mid-2010 amounted to U.S.$3.7 trillion. These private and public assets represent a rich source for new business in local financial centers. Not to mention the immediate benefits of a dynamic financial sector which typically contributes between 4% and 8% to gross value added in an economy and offers a large number of qualified jobs at financial firms and service providers.

In light of these advantages, emerging economies have increasingly laid the foundations for their own financial hubs, pursuing national, regional, or even global ambitions. The most important examples include Beijing and Shanghai as mainland China's premier financial centers, which are benefitting from the country's policy of opening up its financial markets, based on far-reaching regulatory reform since the late 1990s, the establishment of an advanced regulatory and supervisory system, and increasingly mature market segments. Growing domestic demand for financial services and the government's reform policies are expected to maintain the dynamism of the Chinese financial industry, bringing its shares in the global financial market from 9% to 13% in banking, from 2% to 5% in bonds, and from 6% to 16% in equities.

Similarly, Dubai has an ambitious agenda for becoming a regional financial hub, current economic problems notwithstanding. To that end, the authorities provided a light-regulated market environment, undertook heavy investments in financial market infrastructure, and created a network of shareholdings in major stock exchanges worldwide. Similar projects, albeit at a smaller scale, have been drawn up for other marketplaces in emerging economies around the globe.

In terms of the crisis impact, the fallout may exert an accelerating effect on the rise of emerging market financial centers. Most emerging economies and their financial markets performed solidly during the crisis and have emerged strengthened since. Regulators and supervisors proved

capable of handling the difficult situations that spilled over from the U.S. and Europe. And policymakers in key emerging markets were quick to pick up the invitation by the G7 to join the G20 group, and have participated mostly constructively in formulating a globally coordinated economic and regulatory response to the crisis.

Overall, countries like China, India, Brazil, Russia, and others have succeeded in enhancing their reputation as stable and reliable markets, while the long-standing credibility of established financial centers as strongholds of financial stability with superior regulatory and supervisory institutions and processes has suffered perceivably. In parallel, financial markets in the emerging economies have recovered quicker than those in the advanced economies, returning fast to the status quo ante in terms of market prices, volumes, and liquidity. The landmark privatization of part of Agricultural Bank of China's capital and the ability to raise record volumes of fresh capital in the wake of the crisis in July 2010 can be seen as a symbolic event in the broader competitive setting.

The progress made in individual countries, however, cannot belie the fact that many emerging financial centers still have a long way to go to reach the critical volumes, liquidity, levels of maturity, breadth of product choice, capacity and stability of market infrastructure, and market oversight by regulators and supervisors that have been achieved in London, New York, Hong Kong, Singapore, Frankfurt or Paris over many years. Nevertheless, it is safe to expect that centers like Shanghai, Mumbai, Dubai, and others will assume strong regional and possibly also global positions within the next decade.

National focus as transitory advantage for smaller centers

One of the key trends in the wake of the crisis has been the refocusing of market participants and policymakers on their national markets. As a result, local and regional financial marketplaces may hope for continued relevance, even if such a national focus may only be a transitory phenomenon.

The financial crisis has highlighted the interconnectedness of financial markets across national and regional borders. In their drive to reduce risk exposures, many market participants have cut back foreign operations and cross-border transactions, and retreated to more familiar territories for lending and funding. Clients, in turn, have been disquieted by the risks involved in cross-border business, for example, regarding insufficiently insured deposits with foreign banks in some jurisdictions or unprotected securities by foreign banks in others. This renationalization was observed in many parts of the industry, including lower cross-border lending volumes, lower claims by E.U. banks on third-country banks, a much-reduced cross-border mergers and acquisitions business, as well as a substantial increase in domestic money market business relative to foreign transactions. Similarly, policymakers have primarily been concerned with stabilizing their home markets, with bank rescue packages and fiscal stimulus programs naturally targeted at their domestic economies.

Owing to recent regulatory responses, this national focus is set to continue. For one thing, regulatory provisions on bank support and resolution in the U.S. and the E.U. are likely to put cross-border operations at a relative disadvantage. In addition, national supervisors may require foreign banks to maintain additional capital cushions. And rules to limit the size and complexity of large banks may discourage foreign business or investments.

The bottom line of these trends is that – at least for an interim period – there is a tendency for many parties involved to keep their eyes on their home turf, and be hesitant about what has come to be perceived as overseas adventures. This provides a welcome breathing spell to local, national, and regional financial centers across the world which had been challenged by the rising competitive pressure from international centers and their market participants. One central question therefore is, how long this home bias can be expected to last.

In the long run, there is a strong rationale for markets and regulators alike to return to a strategy for stable global markets. For market participants, the benefits of cross-border diversification of risks and of exploiting profitable investment opportunities abroad are substantial and have been driving the development of the industry for more than a century. A national focus, in contrast, limits product choice and the scope of risk diversification as well as business opportunities in a world that in most other sectors is farther advanced in terms of globalization than the financial business. For the markets, therefore, there is a strong rationale to resume their cross-border activities.

The national emergency measures undertaken during the crisis, of course, were vital for the financial sectors and the wider economies affected. Their long-term effects in terms of discouraging foreign business, however, may be detrimental. In addition, the regulatory response to the crisis in the U.S. and the E.U. and elsewhere are falling far behind the expectations raised in the course of the G20. Despite strong commitments to a globally coordinated regulatory response, the consensus on cross-border cooperation on key regulatory issues, including central dossiers such as capital requirements, bank resolution, or derivatives clearing, has been falling apart in the course of 2010.

Despite these setbacks, globally consistent regulatory solutions may be achieved in the end. For one thing, the freedom of international capital flows by itself is not considered part of the causes of the crisis, but at most as transmitters of its effects. More importantly, national solution may, in the long run, stand in the way of achieving greater financial stability once

financial markets have resumed their global business. On the contrary, financial market regulation needs stronger international coordination, far beyond what has been agreed by the G20 and other bodies. Over time, it may, therefore, be expected that an alignment of rules and practices will be achieved at G20 level, providing a suitable regulatory framework for the financial market realities in the post-crisis era.

If this logic prevails, the tailwind local and national financial centers currently enjoy may be of limited duration. This does not call into question their business model as regional financial centers. But it will make it harder for them to compete for clients and business opportunities.

Good regulation as a competitive advantage

Providing a regulatory framework that secures financial stability and promotes market efficiency and innovation will be a key determinant of competitiveness of financial centers going forward. The soundness of a financial center's regulatory framework has always been an important criterion for their competitiveness, and it will be even more important in future. Two elements contribute to the quality of the political framework. First, effective rules and processes aimed at safeguarding the stability of financial system are top on the political agenda, and a vital precondition for market participants to choose a business location. Second, the regulatory environment optimally also promotes the efficiency of markets and creates an environment for innovation. Market efficiency not only benefits the final clients of the services providers, but also contributes to the stability of markets, minimizing the risks of market distortions caused by inefficiencies and of regulatory arbitrage. In particular, regulatory inefficiency can undermine the political and societal objective of stable financial markets if it incentivizes market participants to pursue their business outside the regulated markets so that transactions get crowded out into less regulated markets.

One of the key consequences of the financial crisis has been that the tolerance of financial market policymakers regarding unregulated products and markets, and in particular financial centers which defy compliance with international rules regarding taxation, money laundering, corruption, terrorist financing, and prudential standards. This is reflected by the G20's decision to close regulatory gaps around the world and work towards the adherence to international standards in sensitive areas. The Global Forum on Transparency and Exchange of Information, the Financial Stability Board, and the Financial Action Task Force, have commenced systematic work on identifying high-risk jurisdictions and fighting non-cooperative jurisdictions, with many now subscribing to the relevant standards and prohibiting non-compliant market practices in their financial centers.

As a result, financial centers whose success in the past rested on light regulation or tax arbitrage may find it hard to compete in future as international political pressure and the stigmatization of the markets and their participants is set to rise. In the end, off-shore centers will need to make difficult strategic decisions between, on the one hand, risking increasing stigmatization and reputational damage, or, on the other hand, fully subscribing to global standards and competing on other, more politically acceptable grounds.

Beyond the heightened sensitivity to security-related issues, the regulatory impact on financial centers is less clear-cut. In the course of the crisis, the need to make the financial system in the U.S., Europe, and elsewhere more resilient provided a strong impetus for public policymakers to strengthen their regulatory frameworks, and to do so in a preferable coordinated and consistent way. The G20 process and its conclusions bear witness to this rationale. This is an important development for market stability, but it also bears important implications for the competition between financial centers.[15] On the one hand, policy coordination in the context of the G20 and an increasing alignment of key market rules across the major advanced and emerging economies may narrow the scope for regulatory competition and can help discourage regulatory arbitrage.

The G20 deliberations, however, also suggest that it may be difficult for the participating economies to arrive at consistent rules in the end. Instead, national political considerations increasingly take precedence over the need to establish an internationally consistent set of rules. In that case – for example, if G20 leaders fail to maintain the Basel accord as an internationally accepted standard for bank capital requirements, or if divergent solutions are found for the treatment of alternative investment vehicles, or for bank resolution regimes – the differences in market rules will influence the competitive positions of the financial centers located in jurisdictions such as the U.S., the E.U., or Asian countries.

The effects of heightened regulatory competition can be complex. At a general level, well-regulated financial centers with sound prudential requirements and effective mechanisms for supervisory intervention may be considered as safe harbors by most market participants, especially under the influence of the crisis. At the same time, market participants are under extreme cost pressure and may react particularly sensitively to cost differentials in their operations accruing from regulatory discrepancies across borders. Others may in fact actively exploit opportunities for regulatory arbitrage. For financial centers, this raises two broad issues. First, they will find it useful to analyze the concrete impact of regulatory developments on the market participants in their business locations, and find appropriate answers to the questions this may raise. Second, and in as far as financial centers can influence the course of rule making in their jurisdictions, they can attempt to influence which types of business and business practices they wish to host in their location.

15 For a detailed analysis of regulatory reform in the U.S. and a comparison with equivalent E.U. initiatives see Kern (2010).

Conclusion

The financial crisis and its regulatory consequences are set to change the landscape of financial centers worldwide and the competition among them. Just how much change is set to occur depends on a number of complex and interrelated factors.

Quite certainly, the crisis will not alter the fundamental trend of global shift that has been progressing for a number of years. While established financial centers in the U.S., Europe, and Asia have been successful in maintaining their dominate positions as global financial centers, emerging financial markets are growing fast and capture increasing shares of local and regional businesses. Thus, established global financial centers like New York, London, Hong Kong, or Singapore as well as up-and-coming emerging centers such as Shanghai, Dubai, or Sao Paulo may come out strengthened from the crisis.

Some of the emerging centers have international ambitions, and it will not be long before Beijing, Shanghai, and Dubai will rise to global importance and challenge the established centers. If anything, the crisis has accelerated this process.

At the same time, national financial marketplaces currently benefit from the focus by market participants and policymakers on the domestic dimension. But there are indicators that suggest that this trend may be short-lived. Centers which either lack the critical mass in terms of underlying economic growth or concentration of financial activity – including many continental E.U. markets such as Frankfurt, Paris, or Madrid – will find it harder to compete in the long run.

Finally, regulation is becoming an increasingly important factor in financial center competition. The key question is to what extent it will be a differentiating factor in case the G20 nations succeed in achieving greater homogeneity in the regulatory and supervisory frameworks. Given the flux in the political process, this can only be judged further down the road. More concretely, however, centers whose success in the past rested to a critical extent on regulatory arbitrage, tax evasion, or even illicit activities – especially off-shore centers – are increasingly experiencing strong headwind in the international political arena.

What is important for all financial centers around the world are two issues. For one thing, more decisive progress on global standardization of financial market regulation, and convergence and mutual recognition of existing market rules will be key to achieving a more resilient global financial market. Only if regulation and supervision keep up with pace of financial globalization will it be possible to fundamentally improve the integrity of the system as a whole. And this lies in the interest of all financial centers alike. Finally, in the rivalry between financial centers, regulatory competition must play a constructive role. It should not lead to further regulatory fragmentation – the only outcome of which would be higher costs for all. And their competitive edge should not be sought via lowering regulatory standards. This would come at expense of financial system as a whole.

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PART 1

Unwrapping Fund Expenses: What are You Paying For?

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Abstract

It has become almost conventional wisdom that investors should avoid funds with high expense ratios. Like many nuggets of conventional wisdom, there is some truth, but many exceptions: some of the best funds come at the price of higher expense ratios. Financial planners need this type of evidence to justify selecting particular mutual funds that are appropriate for their clients, even if there are "lower cost alternatives" available.

1 The views expressed are as of December 26, 2009 and are those of Dr. Brian Jacobsen, Ph.D., CFA, CFP® and not those of Wells Fargo Funds Management, LLC. The views are subject to change at any time in response to changing circumstances in the market and are not intended to predict or guarantee the future performance of any individual security, market sector, or the markets generally. Wells Fargo Funds Management, LLC, is a registered investment advisor and a wholly owned subsidiary of Wells Fargo & Company. Not FDIC insured, no bank guarantee, may lose value.

A financial planner who holds him or herself out to be a fiduciary is faced with what can be a dilemma: do what is in the best interest of the client, or avoid apparent conflicts of interest. This dilemma comes from the apparent conflict that occurs when a planner is compensated by a fund company through a load or a 12b-1 fee. The client may perceive that the planner's objective is not to get the best portfolio for the client, but to only enrich the planner. The key to avoiding this conflict is for planners and brokers to not push a product, but to serve the client. Another way around this conflict is to clearly communicate to the clients that sometimes you get what you pay for and better performing funds may require paying a load or a higher expense ratio.

The cost of investing

How expensive is it to invest in a mutual fund? From an investor's perspective, all of the costs of investing in a fund can be partitioned into two parts: the costs of transacting and the costs of holding. The costs of transacting include front-loads and contingent deferred sales charges. Expenses, as opposed to fees, are deducted directly from the assets of the fund. These expenses can either be explicit – payments of brokerage fees for transactions, electricity, etc. – or implicit – lost trading opportunities, style drift, price impact, etc. All expenses either come from the fund assets or lower the value of fund assets from what they could be.

The 12b-1 fee is a chimera: it is a fee, but it is deducted directly from fund assets as part of the expenses. Though it is associated with the costs of buying a fund since it is used to pay for distribution and marketing the fund, it is paid as though it is part of owning the fund. This is really no different than how a manufacturer embeds advertising costs in the price of a product though, so it is not something unique to the mutual fund industry.

Expenses

The expense ratio is the percentage of mutual fund assets paid for operating expenses, management fees, administrative fees, and all other asset-based costs incurred by the fund, except brokerage costs. Items included in the expense ratio are reflected in the fund's net asset value (NAV) and they are not really visible to the fund investor except through the disclosure of the expense ratio. The reported net return equals the fund's gross return minus its expenses. For a mutual fund, the expense ratio is equal to total expenses divided by the fund's average net assets.

Built into the expense ratio can be a 12b-1 fee, named after the Securities Exchange Commission rule in 1980 authorizing funds to pay for marketing and distribution expenses with this fee [O'Neal (1999)]. The 12b-1 rule allows funds to levy a charge of up to 1.00% of average net assets per year to cover distribution costs like advertising, paying brokers to sell the funds, and general marketing expenses. In addition to the 12b-1 fee, funds charge for other administrative expenses, all of which comprise the expense ratio. The only fee that is not included in the expense ratio, besides front-loads, redemption fees, or contingent deferred sales charges, are brokerage expenses for actually executing the transactions. Brokerage expenses are deducted immediately from the net assets of the fund, so these fees are embedded in lower net asset values of the funds.

Fees

There are numerous fees a mutual fund company can charge investors: fees for purchase (charged up front or deferred), fees for redemptions, fees for account maintenance, and fees for exchanging money between funds within the same fund family. Some of these are limited by law. For example, the fee for purchasing a fund cannot exceed 8.5% of the assets invested.

Loads are compensation to distributors and salespeople for marketing the fund. These loads do not represent expenses that the fund incurs, but they are fees incurred by the investor. There are three types of loads: front-end loads, contingent deferred sales charges (deferred loads), and level loads (redemption fees) [O'Neal (2001)].

How you package a fee matters. Thaler (1985) argues that people are less sensitive to losses when those losses are aggregated with other losses or with larger gains. So, when the loss is built into the return, and it is non-obvious, investors will be less sensitive to its effects. Consequently, investors should be less sensitive to differences in 12b-1 fees and other operating expenses than they are to differences in front-end loads and deferred sales charges.

Share classes

Which fee structure is the best for the investor? This question is complicated by the proliferation of multiple-share classes. Essentially, these classes represent the same underlying basket of securities, but investors are given their option of fee structure. Morey (2004) found that prior to the mass adoption of multiple-share classes, load funds held less cash than no-load funds, but after the adoption of multiple-share classes, there was no discernable difference between load funds and no load funds in their cash holdings. Assumedly, this is because, initially, a fund manager could stay "fully invested" more easily if the manager knew the money invested was "sticky."

The rise in the number of multiple-share class funds is due to the 1995 Rule 18f-3 by the U.S. Securities Exchange Commission. The original justification for the rule was threefold:

1) It would provide for additional choices for investors to pick their most preferred fee structure without raising the cost of operating the fund.

2) It would allow for a larger asset base, which would allow funds to achieve economies of scale, allowing funds to pass on these lower costs to investors.
3) It would allow funds to compensate brokers for selling their funds.

Front-end loads and deferred sales charges were the most popular and obvious fees that investors faced before the 1980s. These were, ordinarily, compensation to brokers who sold the funds to investors. Or, these fees served as incentives for investors to stay invested in the fund for a longer period of time. Rule 12b-1 allowed mutual funds to market their funds directly to the public, circumventing the financial planner or broker. This distribution expense is a persistent drag on performance, just like operating expenses, as it is directly deducted from the assets of the fund instead of being billed directly to the investor.

Front-loads are paid when the shares are initially purchased. A portion of the purchase price is paid as a load and the balance is used to buy shares in the fund. Part of the load is paid to the fund distributor and some to the broker or planner. Typically, this load is reduced as the amount invested increases by using break-points. Most front-end load funds also incur 12b-1 fees, which results in a sort of annuity being paid to the broker. These fees can be securitized and sold to investors and then paid to the advisor as a lump-sum.

Deferred-loads (properly called contingent deferred sales charges) are paid when the shares are redeemed instead of when they are bought. This fee is usually reduced over time as the investment stays in the fund, being eliminated entirely after six to eight years. The distributor still pays a sales commission to the broker or planner despite the investor not paying the fee until an indefinite time. These shares also ordinarily incur 12b-1 fees that are higher than the 12b-1 fees on front-load shares. After a certain number of years, these deferred-load shares convert to front-load shares, so the 12b-1 fee is lowered after a certain period of time and the deferred charge is eliminated.

Level load funds usually have no load, but only incur a 12b-1 annual fee. The broker receives a commission that is less than what is gotten from selling a front-load or deferred-load fund, but the annuity (the 12b-1 fee) is comparable to that on a deferred load fund and is not reduced after a certain period of time as the deferred load 12b-1 fee is.

Which type of fee results in the highest return to the investor depends on the investor's investment horizon. O'Neal (2001) has shown that level load funds are preferred when the holding period is six or fewer years. If the holding period is greater than six years, front-load and deferred-load funds are preferred to level load funds because of the lower 12b-1 fees.

Conflicts of interest

Because of the structure of the fees they receive, planners' and brokers' interests are diametrically opposed to their clients', preferring to sell front-load and deferred load funds when the investor wants level loads, and selling level load funds when the investor will prefer front-load and deferred load funds.

Ribstein (2004) argues that one way to overcome this conflict of interest is to tie management fees to performance rather than the size of a fund's assets. However, that would require a revamping of the 1970 Amendment to the Investment Advisors Act of 1940 that requires mutual fund fees to be based on assets under management and not performance [Das and Sundaram (2002)]. Down the distribution chain, to the distributor, the financial planner, the registered representative, or the broker, a fee only arrangement where the client, not the fund company, pays the advisor would better put the client's interests first and not tempt a salesperson to push a product merely because it can generate him or her higher fees.

No doubt, some of the problem might stem from confusion over what the investor is actually paying, which is a form of price obfuscation. There are many alternative fee structures, plus the majority of the costs are not directly billed to the customer, but are instead deducted from the fund assets. There is also no mechanism of arbitrage available (i.e., shorting a high expense index fund and going long a low expense index fund). Hence, uninformed investors do not benefit from the existence of sophisticated investors [Elton et al. (2004)].

Investors may not have, or they may not be willing to process, sufficient information. So, it is important to take the next step and provide the information that investors may be lacking in a way they can understand. Mutual fund disclosures may help in this regard, but there is a natural skepticism of any consumer when they get information from the seller. That is the role of financial planners – to provide unbiased information.

Fee choices as a form of price discrimination

Besides the conflicts of interest, fees may have resulted in an increase in operating expenses and other costs to investors. The reason why is similar to why it is that insurance companies offer a menu of policies with various deductibles and coverage limits. Different policies come at different prices, and the insurance company's objective in setting the menu of policies is to have the insured self-select into their appropriate risk class creating what is called a separating equilibrium. This is to be contrasted with a pooling equilibrium where everyone – regardless of risk – picks the same insurance policy because it is the cheapest.

When it comes to setting premiums, insurance companies would like to charge high risk individuals high premiums and low risk individuals lower premiums. With asymmetric information, when the potential insured has

more information about his or her risk characteristics than the insurance company, if the high premium is charged to all policyholders, then the low risk individuals will self-select out of the pool of insured individuals. This leaves only high risk individuals in the pool of insured, raising the risk profile of the pool, resulting in higher policy payouts. Alternatively, the insurance company can charge the low premium where everyone can afford coverage, but then the insurance company will lose money by insuring the high risk individuals at an artificially low premium. This latter strategy, of charging the low premium is an example of a pooling equilibrium where everyone, regardless of risk-profile, chooses the same policy. If the insurance company can structure the policy options such that the high risk individuals choose the high premium policies and the low risk individuals choose the low premium policies, then they have created a separating equilibrium where the individuals with different risk-profiles are separated into different groups.

This is analogous to what has happened in the mutual fund industry with multiple-share classes: individuals with different preferences can invest in the same fund, but at different costs. By definition, this is price discrimination – where different customers pay different prices for the same product. All price discrimination schemes result in higher profits to the seller compared to a uniform pricing situation. This is not all bad though as it has resulted in more individuals being able to participate in investing.[2]

Past studies on fees and performance

Why do investors choose higher fees? Dellva and Olson (1998) argue that paying these fees could be justified if they allow the fund to lower other costs or somehow improve performance. Dellva and Olson (1998) found that 12b-1 fees, deferred loads, and redemption fees increase fund expenses; whereas, funds with front-end loads generally have lower expenses. They also find a differential in the risk adjusted returns of funds depending on the type of load. Those funds with lower expenses have superior performance, so a load that allows an investor to purchase a fund with a lower expense ratio should result in superior returns. Malhotra et al. (2007) find that there are economies of scale in fund administration where higher assets under management result in lower operating expenses. Thus, there is a cost savings justification for assessing a 12b-1 fee if the marketing and distribution results in higher assets under management.

Some of the difficulty with undertaking a funds expense study is in determining the actual expenses of any given fund. The publicly available information is related to loads, expenses, and distribution fees. Actual trading costs are only reflected in a reduced net asset value and are publicly available only by digging through forms filed with the Securities Exchange Commission (form N-SAR).

Barber et al. (2006) (henceforth, BOZ) argue that investor decisions are driven by salient information like front-end loads and not fees that drag on performance (like 12b-1 fees). BOZ find a consistently negative relationship between fund flows and front-end load fees and commissions charged by brokerage firms. They also find that there is a slightly positive relationship between operating expenses and fund flows, which is only justified if the higher operating expense funds provide additional services other than simply investment performance.

Chalmers et al. (2001) use actual trading expenses to look at the value of active management. What they find is that these expenses are negatively related to returns. Since many mutual fund expenses are fixed costs, asset growth should reduce the ratio of fund expenses to average net assets. Latzko (1999) estimated this relationship for 2,610 funds. The ratio of the percentage change in fund expenses to fund assets is significantly less than one, indicating that there are scale economies in mutual fund administration, so average costs diminish over the full range of fund assets [Malhotra et al. (2007)]. However, the really rapid decrease in average costs is exhausted by about U.S.$3.5 billion in fund assets. This may be the "sweet spot" of assets under management for most equity mutual funds.

Rao (2001) finds that high expense funds lag their low cost competitors because the expenses have a big impact on net investment performance. Haslem et al. (2008) come to a similar conclusion, as do Dukes et al. (2006).

Returns and costs

Theoretical relationships

There are many factors that affect the fees of funds: economies of scale typically result from centralized computer facilities, financial activities, purchasing, marketing, etc. [Rao (2001)]. Additionally, the age of a fund may help explain the expenses it incurs if there is a "learning curve" where the fund operator learns how to operate more efficiently over time [Rao (2001)]. The objective of the fund will also determine the fees incurred [Peterson et al. (2002)]: funds that invest in illiquid securities or engage in active management will incur more expenses than a relatively passive fund. So, fees should be determined by such factors as assets under management, tenure of the manager, turnover, and investment objective.

At a certain point, diseconomies of scale may arise as assets under management become too large [Indro et al. (1999)]. This can occur for a variety of reasons: it becomes more difficult to manage a larger staff of analysts, large block trades are more expensive than small block trades, and, if there is information embedded in a trade, a large trade may have a large price impact on the security being bought or sold [Dowen and Mann

2 For a contrary view as to whether greater public participation is socially desirable, see Ribstein (2004) and Jackson (2003) who both argue that with uninformed investors participating in the markets, there are greater opportunities for these uninformed to be fleeced by the informed.

(2004)]. For all these reasons, a quadratic relationship may exist between the size of a fund and the expenses where expenses decline as the fund grows to a certain minimum efficient scale (the minimum expense point) and then the expenses begin to increase as the fund grows. Previous studies have used the natural logarithm of assets under management to adjust for economies of scale, but the natural logarithm is a monotonic function which means it assumes economies of scale continue indefinitely and there are never diseconomies of scale. A market with such extreme economies of scale would be typified by a single, natural, monopoly. For this reason, the quadratic form I employ is superior to functional forms in previous studies.

The learning curve effect suggests that expenses may decline and plateau at a certain point, making the relationship between manager tenure and expenses nonlinear. Though not perfect for capturing this effect, the natural logarithm of the years a manager manages a fund is an adequate measure capturing this learning curve effect.

The investment objective can be measured in a variety of ways: you can categorize funds according to their stated objective, according to their stated benchmark, according to their classification based on holdings, or according to their classification based on the similarity of their returns to other funds [Busse (2001), Ferson and Warther (1996)]. In this paper, I examine only those funds with the same stated benchmark – the S&P 500 – and a coefficient of determination (R-Squared) of at least 75%.

Data and methodology

I used Morningstar's Enhanced database, as of December 27, 2009, for this study. All no front-load, no contingent deferred fee, and non-index U.S. equity mutual funds with assets under management reported of greater than one million dollars, manager tenures of greater than zero, and a track record of at least three years were included. This left 976 mutual funds to be analyzed. The funds were categorized according to the fund's coefficient of determination with six different indices: the Russell 1000, the Russell 1000 Value, the Russell 1000 Growth, the Russell 2000, the Russell 2000 Value, and the Russell 2000 Growth index. Each fund was compared relative to the category where it had the highest coefficient of determination.

To see whether fund expenses impacted category relative returns, I measured returns as the annualized three year total return. As a first pass, I simply regressed the three year total return on the prospectus reported net expense ratio. According to Morningstar, this expense ratio is "the percentage of fund assets, net of reimbursements, used to pay for operating expenses and management fees, including 12b-1 fees, administrative fees, and all other asset-based costs incurred by the fund, except brokerage costs. Fund expenses are reflected in the fund's NAV. Sales charges are not included in the expense ratio."

As a second pass, I regressed the three year total return on the prospectus gross expense ratio, the 12b-1 fee, and the redemption back to the fund.

Next, in order to see what determines the expenses of a fund, I regressed the prospectus net expenses minus the 12b-1 fee on the log of the manager tenure (the learning curve effect), the fund's assets under management, the square of the fund's assets under management (for economies of scale), and a proxy for transaction costs. In order to develop the transaction cost proxy, I simply used 100 minus the coefficient of determination under the assumption that the less similar to a passive index a fund's returns are, the more active the management of the fund must be.

Returns: results

Expenses are negatively related to fund returns only for those funds in the Russell 1000 and the Russell 1000 Growth categories. For all other categories, there is no statistically significant (at the 5% level) relationship between fund expenses and three year returns. Further, when decomposing the fee into its constituent parts (gross expenses, the 12b-1 fee, and the redemption back to the fund), none of these matter in explaining fund returns. Even in terms of the two categories in which expenses statistically mattered, a one hundred basis point increase in fund expenses was correlated with a 1.36 to 1.46 decline in three year annualized total returns.

Expenses: results

According to the traditional argument, a manager with a longer tenure should be more efficient than a new manager. If there are economies of scale at the fund level, the squared term of assets under management should be positive. If transaction costs increase operating expenses, then turnover should be positively related to expenses. Finally, if a fund assuming distribution responsibilities is positively related to operating expenses, then the coefficient associated with the 12b-1 fee should be positive.

The actual results are generally as expected, regardless of fund category, except for the manager tenure term (Table 1). While I expected this term to be negative, it was actually positive, suggesting that the longer the manager tenure, the higher the expenses of a fund. This may be because a manager with a longer tenure can command higher compensation.

Most interestingly, mutual funds demonstrate economies of scale up to a minimum efficient scale. This means that it is justifiable for a fund to incur distribution expenses to increase assets under management, but only up to a point. At a certain point, diseconomies of scale set in, which means a fund should close to new assets. Table 2 shows the minimum efficient scale of operations of a fund according to its category: these minimum efficient scales are rough estimates of the range over which expenses

Variable	Coefficient	Expected value	Reason
lnManager	β1	<0	Learning curve
AUM	B2	<0	Economies of scale
AUM-Squared	B3	>0	Economies of scale up to a limit
Turnover	B4	>0	Transaction costs

Table 1 – Theoretical relationships between variables and actual estimates

Category	Minimum Efficient Scale
Russell 1000	U.S.$22,232,733,559.03
Russell 1000 Value	U.S.$21,220,755,408.29
Russell 1000 Growth	U.S.$33,080,626,532.40
Russell 2000	U.S.$2,870,851,085.92
Russell 2000 Value	U.S.$3,954,249,824.39
Russell 2000 Growth	U.S.$8,727,910,261.96

Table 2 – Empirical assets under management at which expenses begin to increase

could be decreasing for various categories of funds. Considering that there is only a statistically significant relationship between expenses and returns for the Russell 1000 and Russell 1000 Growth categories, these results should mainly be of significance to fund advisors in determining when it may make sense to close a fund to new investors.

Conclusion

Investors and financial planners should not shy away from a fund simply because of its expenses. There is little relationship between three year annualized returns and fund expenses. Considering the competitive nature of the investment industry, it should not be a surprise that higher expenses need to be correlated with higher gross returns such that net returns are unaffected by expenses. If this was not the case, investors should walk away from the underperforming funds.

Additionally, there is considerable debate over the propriety of funds charging 12b-1 fees. It is important to remember that the 12b-1 fee is included as part of the expense ratio of a fund. It is not a separate charge and it should be considered whether eliminating 12b-1 fees would result in an overall reduction in expenses or, instead, expense ratios would be unchanged and what was classified as a 12b-1 fee would instead become part of the general expenses of the fund.

Fund advisors can impose discipline on financial planners and financial advisors by directly marketing a mutual fund to the investing public. The existence of 12b-1 fees, front loads, or contingent deferred sales charges simply provide a variety of different ways to give investors access to investments. Conceptually, it is no different than a manufacturing company distributing its product through a variety of retailers and factory direct. This research has demonstrated that there is no statistically significant evidence of higher expenses or fees leading to inferior investment performance.

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Securitization of Financial Asset/ Liability Products with Longevity Risk

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Abstract

This paper examines the securitization of financial products that have both assets and liabilities, and that are affected by longevity risk. The longevity risk is what determines the magnitude of the assets and that of the liabilities embedded in the financial product to be securitized. Examples of such financial products are senior life settlements, viaticles, reverse mortgages, or annuities.

Typical asset-backed securities are securities backed by the cash flows generated by a pool of assets, such as mortgages, car loans, or student loans. There is, however, a family of financial products that is a combination of both assets and liabilities such as life insurance products or reverse mortgages. The value of these financial products depends on the life expectancies (LE) of individuals tied to such financial products. In the case of senior life settlements, the value depends on the LE of life settlers. The fact that settlers may live above or below projected LEs, affects the value of the liability relatively to that of the asset backing the securitization of such financial product.

"Senior life settlements are created by the purchase of life policies from senior policy holders. The purchaser of the policy becomes the beneficiary and takes over in making the periodic premium payments to the insurance company. The seller of the life insurance, the life settler, has an estimated life expectancy that is determined by his/her health conditions and age at the time of the transaction. The buyer, typically a company, buys many policies, with different life expectancies, premiums, and death-benefit amounts. When a sufficient amount of policies has been accumulated, they can then be securitized. Investors buy securities backed by the positive death benefit payments and the negative premium payments. The death benefit payments more than outweigh the premium payments, the difference between the two being a function of the life settlers' life expectancy" [Stone and Zissu (2009)].

We can consider the premium payments as the liability component and the death benefit as the asset component backing the securitization of senior life settlements. In the late 1980s, early 1990s, a similar financial product to that of life settlement had been created, it was the viaticles. The main difference with senior life settlements is that viaticles was the purchase of life insurance from people with terminal diseases, with an LE of two to three years only. Senior life settlements have LEs ranging anywhere from a minimum of two years to about twelve years. When, in the late 1990s, a new class of drugs known as protease inhibitors, used in combination with AZT, viators with AIDS started to live longer than their original projected LE, and the value of the liability backing viaticles increased above the value of the assets.

In general, the only raison d'être for all of these financial products backed by combined assets and liabilities, as a function of LE, is that the value of the asset is greater than that of the liability. The longevity risk, however, is the component that may either reduce the gap between asset and liability or even invert their magnitudes. This is what we have observed with viaticles. Initially, when such product was created, the present value of the death benefit, the asset, was, by far, greater than the present value of the premium to be paid, the liability. Then, with the discovery of new drugs, viators started to live longer than expected, above the projected LE, and premium needed to be paid for many more years, whilst the death benefit was pushed further out in the future, before being collected. The value of the liability became greater than the value of the asset.

In this paper we develop the time at which a crossover point is obtained. We call the crossover point, that point where the present value of the asset is equal to the present value of the liability. We will then interpret the results with some applications to the securitization of senior life settlements.

Model

The valuation of a senior life settlement, V(sls), is obtained by discounting the premium paid at the end of each year, -P (the liability), and the death benefit B (the asset) collected at the time when the life settler dies. For simplicity a flat yield curve is assumed, with a discount rate of r. The valuation is based on a life expectancy of t years.

$$V(sls) = -P[(1/(1+r)^1) + (1/(1+r)^2) \cdots + (1/(1+r)^t)] + B/(1+r)^t \quad (1)$$

Equation (1) can be re-written as: $V(sls) = -P(1/r - a^t/r) + Ba^t$, where, $a = 1/(1+r)$

where

Let us call $X = P(1/r - a^t/r)$ (2)

X being the liability backing the securitization, and $Y = Ba^t$ (3)

where Y is the asset backing the securitization.

From Equation (3) we get that $Y/B = a^t$.

Replacing then a^t in equation (2) we obtain:

$$X = P(1/r - Y/Br) \quad (4)$$

This is a relationship between X and Y, that is the relationship between the liability and the asset.

One can write Equation 4 in the following form: $X = P/Br(B-Y)$

Clearly, Y, the present value of the asset or death benefit, is a negative function of the present value of the liability, the premium. This is because the longer the LE is, the higher is the present value of the liability, the premium; and the lower is the value of the asset, the death benefit.

Intersection and limits of functions

We consider the functions X(t)and Y(t).

Note first that $X(0) = P(1/r - a^0/r) = P(1/r - 1/r) = 0 < Y(0) = Ba^0 = B$

Note also that $\lim_{t\to\infty} X(t) = P/r$ since $a = 1/(1+r) < 1$ and $\lim_{t\to\infty} a^t = 0$

Similarly, $\lim_{x\to\infty} Y(t) = 0$.

Note also that X(t) is an increasing function (since its derivative, $X(t)' = -[Pa^t \ln(a)]/r$ is positive for $[0, +\infty)$ (recall that $a < 1$ so $\ln(a) < 0$)) for $t > 0$.

Similarly, $Y(t) = Ba^t$ is a decreasing function for $t > 0$ (since its derivative, $Y'(t) = Ba^t \ln(a)$ is negative for $t \in [0, +\infty)$.

In summary, X(t), Y(t) are continuous functions such that $X(0) < Y(0)$ and $\lim_{t\to\infty} X(t) > \lim_{t\to\infty} Y(t)$. Furthermore, X(t) is increasing and Y(t) is decreasing in the interval $[0, +\infty)$. It follows from elementary properties of continuous functions that there exists an unique $t_0 > 0$ such that:

1) for every $0 < t < t_0$ $X(t) < Y(t)$
2) for every $t_0 < t$ $X(t) > Y(t)$

An expression for t_0 is easy to obtain from the intersection condition $X(t_0) = Y(t_0)$. We obtain: $P(1/r - a^{t0}/r) = Ba^{t0}$.

Solving for t_0 gives us: $P/r = (P/r + B)\, a^{t0}$, and hence $P/r \div (P/r + B) = a^{t0}$.

We finally get $t_0 = [\ln(P/r \div (P/r + B)]/\ln(a)$.

This expression can be simplified into: $t_0 = [\ln(P/(P + rB)]/\ln(a)$

Interpretations of t_0

It important to understand that t_0 is the crossover point at which the value of the asset is equal to the value of the liability. In reality, however, to make the securitization of such financial products successful, the value of the asset must be greater than the value of the liability, in order to generate net positive cash flows. No investor in the securitization of such financial products would invest if LE was equal to t_0. LE must be lower than t_0 and as distant as possible from it.

The example of senior life settlements

Figure 1 graphs the present value of death benefits (DB) and of premium payments (P) for a senior life settlement over time. The longer the life settler lives, the lower the value of the death benefits is and the higher the value of the premium payments is. When the present value of death benefits is equal to that of the premium payments, the difference between the two is zero. The difference between PV(DB) and PV(Premium) is the value of the senior life settlement, V(sls). The point at which V(sls) crosses the horizontal axis is when LE is equal to t_0.

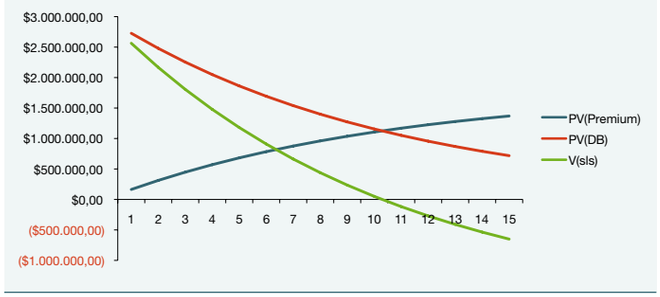

Figure 1 – Present value of death benefits (DB) and premium payments (P) for a senior life settlement

Conclusion

When securitizing financial products backed by both, assets and liabilities, the value of which is determined by life expectancy, longevity risk is the greatest risk to manage. A pool of such financial products that is securitized has a value that is a function of the difference between the weighted average LE of the securities in the pool and the weighted average t_0 of those securities. The conditions are that $t_0 >$ LE, and to create a pool of securities that maximizes $[t_0 - \text{LE}]$. For example, in the case of the securitization of senior life settlements, investors comparing pools should choose the one with $\text{Max}[t_0 - \text{LE}]$, but it is important that the LEs are computed using same mortality tables across pools, or the validity of such test is reduced.

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Part 2

Preventing the Next Great Meltdown

Enhancing the Transparency of Bank Fair Value Reporting

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PART 2

Preventing the Next Great Meltdown[1]

David A. Levine – Sanford C. Bernstein & Co., Inc. (Retired)

Abstract

The regulatory framework established during the Great Depression was dismantled in stages after 1969. The deregulation of deposits at banks and savings institutions created incentives to widen the scope of investments that banks and thrifts could make. Novel instruments were created that should have been more carefully regulated but were not. Despite the collapse of the savings and loan industry, which might have (but did not) inspire a period of re-regulation, the pace of innovation increased. The two instruments that produced the Great Meltdown of 2008 – subprime mortgages and credit default swaps – did not begin to grow explosively until several years after the S&L crisis ended. Assuming it is too late to restore in its entirety the pre-1970 regulatory regime, this paper details the kinds of steps that should and can be taken to prevent another system-threatening financial crisis.

1 An earlier version of this paper (Evaporational exuberance), published four weeks after Lehman Brothers went bankrupt, proposed a framework for reforming the financial system to guard against future meltdowns. The phrase "evaporational exuberance" was taken from a radio program (The Takeaway) that had a call-in segment in October 2008 soliciting suggestions on how the financial crisis might be summarized succinctly.

The recession of 2008-2009 was not the worst since World War II; that distinction goes to the "double-dip" recessions of 1980-1982. But the banking and credit crisis that made it as severe as it was, was the worst since the 1930s and it, in turn, was caused by what was undoubtedly the biggest housing crisis in our history – much worse than what was endured during the Great Depression.[2]

Just as our understanding of what was done and not done during the 1920s and 1930s helped us avoid another depression in 2008-2009, a deeper appreciation of how we went astray in the decades up to 2008 can help protect us in the future.

A brief history of deregulation

The regulatory structure established during the Depression spared us system-threatening financial failure for nearly four decades after World War II – a period during which no supersized financial institution failed.[3] But beginning in 1970, when deposit interest rate ceilings on over-U.S.$100,000 CDs were "temporarily" lifted, there was a step-by-step dismantling of the regulatory framework that had previously constrained the activities of depository institutions. Moreover, new forms of financing were created that should have been regulated, but were not. Every major step in this process – embraced by both Democrats and Republicans[4] – increased the fragility of our financial system.

There were many changes over the years, including:

1) June 1970 – elimination of Regulation Q ceilings (Reg Q) on over-U.S.$100,000 CDs with less than 90-days to maturity. An "emergency" and, supposedly, temporary response to the seizing up of the commercial paper market when Penn Central declared bankruptcy, this ceiling was never reimposed.

2) 1971-2006 – proliferation of novel financial instruments and activities. The two threads with the most serious consequences were these:

a. **Packaging and selling mortgages –** even at first blush, this is not such a good idea because underwriters suffer no direct costs if they do a poor job. This was not critical decades ago when mortgage passthroughs were confined to insured FHA and VA loans and, later, to prime single-family mortgages. But, one thing leads to another, and developments grew more dangerous in the 1980s when financial "engineers" began slicing and dicing mortgages into interest-only and principal-only strips, as well as collateralized mortgage obligations (CMOs). Subprime mortgage volumes could never have approached a fraction of the U.S.$600 billion per year they reached without the smokescreen provided by CMO-type securitization and, as we know from what followed, even Ph.D.s in mathematics woefully underestimated the risks that these instruments entailed.

b. **Synthetic financial instruments, tradable on extreme leverage –** these have been around for centuries, but their proliferation began only after the currency regime establish at Bretton Woods collapsed. Currency forwards (1971) were followed by currency futures (1972), listed equity stock options (1973), GNMA and T-bill futures (1975 and 1976), and stock index futures (1982). By now there are countless such instruments and the trading volumes are huge, but most of those created prior to the 1990s were highly regulated by government agencies that enforced rules (on position sizes, margins and mark-to-market requirements) that have prevented any calamities.

   During the 1970s, 1980s and 1990s, an over-the-counter, not-so-well regulated, forward market developed. Problems that might have arisen from this were generally kept in check because the dominant instruments – currency and interest-rate forwards and swaps – are similar to instruments available in the highly-regulated futures markets. But, in the late 1990s, a brand new instrument – the credit default swap (CDS) – began to grow explosively. This new way to gamble on credit quality was responsible for the freezing of the credit markets in 2008.

Engineers are supposed to make things work better. This renders the expression "financial engineer" an oxymoron (at least in recent decades). Subprime mortgages destroyed the solvency of many institutions, while credit default swaps destroyed the liquidity of many more – even those with little or no exposure to such swaps.

3) May 1973 – elimination of Reg Q ceilings on all over-U.S.$100,000 deposits at commercial banks. The lifting of ceilings on very-short-term CDs in 1970 had been intended to fill the void that resulted from a liquidity crisis in the commercial paper market – a special case. The May 1973 lifting of ceilings regardless of maturity was very different – interest ceilings would never again constrain banks from raising funds and so the growth of bank assets, which had previously been effectively controlled by the Federal Reserve, now fell into the hands of bank management. The prudent banker was replaced by the banker qua risk-taking entrepreneur. But that was not the end of the story because this development immediately raised questions of fairness. After all, if higher open-market

2 Hard house-price data from before World War II seem impossible to come by, but there are scattered claims that prices fell by about 30% in the Depression. In the 2006-2009 housing bust, prices fell by about the same– 32.6%, according to the S&P/Case-Shiller Home Price Index for 20 metropolitan statistical areas. However, during the Depression, the general cost of living (as measured by the Consumer Price Index) fell 27.6% from peak to trough and, so, the price of houses relative to the purchasing power of the dollar appears to scarcely have fallen at all. This time, the cost of living increased 6.3% during the 33-month period during which house prices were falling and, thus, relative house prices fell by 36.6% – a decline that was an order of magnitude worse than during the Depression.

3 Between the end of World War II and 1984, the largest failure was that of the Franklin National Bank in 1974. That collapse resulted from losses on shoddy loans and foreign currency speculation (in roughly equal parts). Interestingly, Franklin's managers were not just incompetent, they were also committing crimes. A dozen or so officials were indicted and several served time in prison.

4 Republicans were arguably generally more sympathetic to this process, but the three most important pieces of legislation (see items 6, 7 and 8 in the main text) all gained substantial bipartisan support and two were signed by Democratic presidents.

rates were warranted for anyone with more than U.S.$100,000, should the "little guy" (i.e., the typical depositor, whether at a large bank, a small bank, or a thrift institution) not get the same deal? And so…

4) 1974-1983 – lifting of Reg Q ceilings (in stages) on all deposits, regardless of size, at savings and loans and other thrifts, as well as at banks. The most important step in this process was not the elimination of the last remaining ceilings in 1983, but the introduction of the Money Market Savings Certificate (MMSC) in June 1978. This new instrument (with a minimum of only U.S.$10,000) effectively deregulated the liability side of financial intermediaries because within short order it began attracting more than 100% of the marginal money flowing into such institutions. The reason, of course, was that the interest paid by the MMSC was much higher than the interest on other types of deposits and so these others were rendered irrelevant. Only very small depositors (who collectively held a tiny percentage of total deposits) were denied market rates.

Along the way, the MMSC posed a grave threat to the solvency of the savings industry and a comparable threat to some regional banks. The reason: the lion's share of those institutions' assets was invested in long-term fixed-rate residential mortgages and as interest rates soared between 1978 and 1980-81 the relentless upward pressure on deposit costs wiped out the profits of the industry. By 1981, more than 90% of all S&Ls were losing money and many were on the verge of bankruptcy. This, in turn, added to the sense of urgency on the part of those promoting the changes you will read about in items 6 and 7 below.

5) 1975 ff – breakdown of constraints on interstate banking. Previously, almost all banks operated in one state only (and sometimes internationally as well). By the mid 1980s, banks could operate freely in 37 states (in which 91% of all banking assets resided). The result: two-plus decades of consolidation/concentration of banking assets in the hands of fewer and fewer companies.

6) 1978-1982 – the first significant use of what were originally called "variable-rate mortgages" occurred in California in 1978. Their yields were tied to the slow-moving "cost-of-funds index" of the region's savings and loans and were limited also by a maximum increase of ¼% every six months. By 1982, the Garn-St. Germain Depository Institutions Act authorized what were now called "adjustable rate mortgages" (ARMs) nationwide. Within a few years, such mortgages were not only widely available but, mostly as a result of the pressures created by the increased variability of deposit costs cited earlier, the typical maximum adjustments doubled in size – to 1% per year or 2% every two years. It was now possible for people to sign up for mortgages that they could afford initially, but which they would then become unable to afford even if they never lost their jobs and continued to have (normal-sized) annual pay increases. I should add that the original California version was subject to lifetime interest-rate increases of 2½% (versus the 5-7% that became common later on), and did not have initial "teaser" rates or payments, let alone features like negative amortization.

There is no theoretical reason to oppose the existence of ARMs provided (a) the borrower's income is high-enough to service the loan at the maximum interest rate allowed under the terms of the mortgage and (b) it is clear that the borrower fully understands how large that maximum monthly payment can be (think Miranda rights for mortgage borrowers). These conditions are rarely met.

7) 1980 ff – the Depository Institutions Deregulation and Monetary Control Act of 1980 was the first and most important step (of a 10-plus year process) which expanded the rights of banks and thrifts to invest in assets that had previously been prohibited or limited because they were considered to be too risky. Owing to pressures emanating from the rise in deposit costs and their increased variability, proponents argued that depository institutions "had to" be allowed to significantly widen the scope of their activities. And, indeed, thrift institutions were now allowed to invest a much higher percentage of assets in construction, development, and commercial mortgages.

Not surprisingly, wheeler dealers figured out that a Savings & Loan was an excellent vehicle for gambling with. The insured depositors could not fail to have confidence in your institution, freeing you to invest in risky projects. "Moral hazard" has existed since the first unscrupulous borrower borrowed from the first sucker, but the level it was taken to by Savings & Loans in the 1980s might have surprised even P. T. Barnum.

8) November 1999 – repeal of the Glass-Steagall provisions that forbade bank holding companies from engaging in other financial businesses (such as insurance, brokerage, investment banking, mutual funds, etc.). Owing to the aforementioned consolidation in the banking industry, this may have had little impact on the 2008 crisis and the scope of the federal government bailout. After all, without Glass-Steagall, instead of the largest 10 bank-like conglomerations controlling assets equal to 60% of GDP, there might have been 20 banks controlling 60% and the government would simply have had to rescue or shore up 20 companies instead of 10. All would have been too big to fail.

Still, the Glass-Steagall repeal will have a post-crisis impact if and when we actually try to solve the too-big-to-fail problem. Prior to repeal, we would have had to shrink our largest financial service companies by factors of 5-10 in order to return to the "systemic comfort zone;" now those reductions would have to be by factors of 10-20. Moreover, by allowing banks to combine with certain non-banking businesses (or directly engage in activities that non-banks do), repeal increased the chances that something would happen that would require a taxpayer bailout.

Deregulation and the financial crisis

Although the Great Meltdown resulted largely from two instruments that had scarcely existed 10 years earlier, the origins go back much further than that. The deregulation of the liability side of the balance sheet of financial intermediaries, by making their costs much more variable, made inevitable the deregulation of the asset side of those same institutions. The new adjustable-rate mortgages did not become highly variable until deposit deregulation was (effectively) complete. When ARMs did not provide full protection, much of what previously had been intermediated was moved off the balance sheets of those institutions (securitization). The subsequent recipe for disaster mixed a bunch of mathematics Ph.D.s with the ethos of Wall Street, but failed to add of a pinch of restraint (via regulation) and we ended up with a series of increasingly complex instruments that spiraled out of control. The complexity, of course, made them incredibly profitable, rendering the chances of self-restraint on the part of Wall Street extraordinarily unlikely.

Mortgage passthroughs were relatively benign (after all, they were simply baskets of instruments that had been around for generations), but CMOs were malignant because their properties were much more difficult to understand (unbeknownst to those analyzing them!). Carving up securities into nonstandard pieces created risks that are "non-stationary" in the extreme – i.e., much more so than more conventional risks. (That's how tails of distributions become "fat tails.") It did not take too long for Wall Street to realize that if interest rate and prepayment risk could be sliced and diced, so could credit quality. And, thus we ended up with two new instruments – subprime mortgages[5] and credit default swaps – that were capable of producing fat tails that nearly destroyed the financial system.

Returning to the subject of the increased fragility of our financial system, the first time a financial company was unambiguously rescued because it was "too-big-to-fail" was in 1984 when the seventh largest bank in the U.S. – Continental Illinois – went belly up. That was the first time the federal government explicitly intervened to protect deposits greater than the insurance ceiling (then, as until 2008, set at U.S.$100,000[6]). It did so owing to the concern that if such a large bank reneged on its depository obligations it would create systemic risks. At the time that it was rescued, Continental Illinois' assets represented scarcely more than 1% of GDP, an amount roughly equal to one-tenth (!) of the size of our largest banks today. When Franklin National Bank had failed in 1974, its assets represented less than ¼% of GDP. That is pretty small considering that at that time there were only 19 larger banks in the U.S.![7]

During the late 1980s and early 1990s, roughly half of the Savings and Loan Industry went out of business – a direct consequence of points #4 and #7 above. Although there never was a sense that this threatened our financial system, the collapse required a massive taxpayer bailout when the Government had to take on the impaired assets left behind by operators who used government-insured deposits to make large bets on risky real estate loans. According to authors Timothy Curry and Lynn Shibut, those costs totaled U.S.$124 billion – or the equivalent of about U.S.$190 billion when expressed in 2010 dollars. In the end, the direct cost to the taxpayer (adjusted for inflation) of the 2008ff. bailout will probably not be much different from the S&L bailout. However, there was no panic (nothing close to panic) as the S&L crisis played itself out because there were no credit default swaps to (a) augment the size of the bets being made and (b) create hidden (and, therefore, terrifying) interlocking exposures.

The first time after World War II that the entire financial system seemed in jeopardy was when Long-Term Capital Management had to be rescued in 1998. The risk parameters in this hedge fund's mathematical models were, to put it charitably, not very well calibrated. Having borrowed U.S.$125 billion against a capital base of U.S.$4.7 billion and having "off-balance-sheet" exposures exceeding U.S.$1.2 trillion, the principals nevertheless were confident that their bets were unlikely to ever lose more than a few hundred million dollars. When, instead they lost more than U.S.$4 billion in a few months, their debt to equity ratio neared 200:1 and their ratio of total exposure to equity capital neared 2000:1! Enter the Federal Reserve Bank of NY which organized a rescue in which more than a dozen banks and investment banks participated. (With LTCM's notional exposure above U.S.$1 trillion, the rescuers were really saving themselves.)

Obviously, neither the S&L collapse nor the LTCM scare rocked or threatened our system like the 2008-2009 financial crisis. Spawned by the subprime mortgage lending debacle, the latest crisis left us exposed to substantial additional damage from prime mortgages (which we mostly avoided) and credit default swaps (which we did not avoid). The credit losses related to the CDS market may not have been that large, but the fact that that market was totally lacking in transparency brought about

5 The reader may be surprised to learn that subprime mortgages have been around for decades – albeit only in tiny quantities. At least as long as 40 years ago S&Ls and banks would make subprime "loans to facilitate" to move foreclosed property off their books. Sometimes this entailed enticing borrowers by lending more than 80% on such properties. And, of course, when mortgage borrowers lost their jobs, their previously prime loans would sometime get transformed to subprime status. The intentional creation of large volumes of subprime mortgages, however, never happened prior to the late 1990s.

6 The 2008 bailout/rescue bill raised the deposit insurance ceiling to U.S.$250,000. If the reader is curious why the insurance ceiling did not rise for a full generation (it had last changed in 1980 when the cost of living was only two-fifth of 2008 levels), the reason is that such a move would have conflicted with the deregulatory ethos of the era.

7 Franklin's uninsured depositors also ended up being protected because the shaky assets were absorbed by the FDIC while all of the deposits and an equivalent amount of "good assets" (consisting of the actual good assets of Franklin plus cash provided by the FDIC) were merged into the European-American Bank. On the other hand, equity shareholders of Franklin lost everything. The Continental situation was different because early on the FDIC announced that all depositors, regardless of size, would be protected and then it proceeded to purchase U.S.$1 billion in newly-issued preferred shares of a recapitalized company (when no merger partner could be found). In the end, even the equity shareholders of Continental Illinois were not wiped out entirely.

the near-total-freeze in the credit markets which caused the recession to be as deep as it was and, for a while, seemed to threaten much worse. Judging from what happened to credit spreads in the autumn of 2008 it seems clear that the market was suspending judgment entirely on whether TARP + fiscal stimulus (and equivalent steps taken in most major economies around the world) would stop the free-fall.

Having managed to avoid the abyss, our task now is to take steps to avoid repeating these mistakes in the future – i.e., to make sure that the financial system and economy are not put in jeopardy and that the financial bad guys do not ever have to get bailed out again.

How can we prevent a recurrence?

The answer is simple: just look in the rear-view mirror – i.e., reestablish a regulatory structure similar or analogous to what prevailed between the 1930s and the 1970s.

There are three key problems:

1. **Some institutions are too big to fail –** this was said to be true of all the companies rescued prior to the collapse of Lehman Brothers, including Bear Stearns, Freddie Mac, Fannie Mae, and AIG, as well as all the major banks which were given capital infusions.
2. **The system is rife with "moral hazard" –** i.e., the "heads-I-win-tails-you-lose" problem. If companies gamble and win, their shareholders reap the benefits. Stock prices can, and sometimes do, go up five- or twenty-fold. But if companies gamble and lose, the loss is limited to their equity stake. That is capitalism and that is fine; but not when the taxpayer has to foot the bill when bets go awry.
3. **Financial engineers have created a plethora of new, complicated and, thus, dangerous instruments –** these instruments (a) sidestepped the existing regulatory regime when they were created, (b) never were brought under the regulatory umbrella, and (c) had the potential to ruin our financial system. (It was not just consumers who did not know how to evaluate subprime mortgages; almost all of the "experts" on Wall Street turn out to have been clueless as well.)

What specific policies should be adopted?

Step 1: forbid activities that give rise to "moral hazard." If some industries are to retain government backing (and deposit insurance on "consumer-sized" deposits is clearly needed to keep the system secure) then their investment activities must be regulated. Restore Glass-Steagall – i.e., commercial banks and insurance companies should be separated from each other and from investment banks and all other businesses that are not "incidental" to traditional banking or insurance activities. We should return to the kind of regulatory oversight regarding how banks deploy their assets that prevailed in the decades up to about 1980. We cannot let banks make large and/or dangerous bets which benefit them if they win and cost us if they lose.

Step 2: with the financial crisis behind us, it is time to start breaking up the financial behemoths – not only those with deposit insurance but all financial businesses that, at their current size, have implicit government backing because they are too big to fail.[8] If, as will be true for a number of large banks, they remain big enough to potentially bring down the entire financial system even after they have spun off their non-banking businesses, the banking portion of the business needs to be subdivided as well. This can be done geographically and/or by line of business. If Standard Oil could be dismantled a century ago, we can do the same to JPMorgan Chase, Bank of America, and Citibank. For many decades, most large banks operated in one U.S. state only (and sometimes overseas as well). If the current Bank of America was broken up into, say, a dozen parts (BA of California, BA of New York, BA of the Carolinas, etc.), the individual banks would be large enough to benefit from substantial economies of scale, but not too large to threaten the financial system.[9]

The counter-arguments to forcing the banks to shrink dramatically are that we need large institutions for reasons of (a) administrative efficiency, and/or (b) so we can "compete" with foreign banks (including the ability to make "mega-loans" to big borrowers). On the first point, you will find (if you examine bank earnings statements) that there are no material cost savings stemming from economies of scale when a bank's assets exceed 0.15-0.20% of GDP (U.S.$22-30 billion). On the second point, one might ask "what are we competing for – so that our banks can get into system-threatening trouble as easily as foreign banks can?" To be sure, if foreign nations do not down-size as well, our system can still be damaged somewhat if foreign banks get into big enough trouble; but any such damage would be far less than we suffered in 2008-2009. Regarding the competition for large credits for very large borrowers whose needs are greater than what can be accommodated by a single bank, the banks can do what they have done for centuries – form consortia.

The recently enacted Dodd-Frank financial reform bill established a framework in which it is possible to "break up the banks." But will it? Here is what I would do: establish a timetable (10 years with interim benchmarks?) by which time every large financial company that was protected by deposit insurance would have to spin off sufficient activities to reduce itself to a maximum size equal to 0.4% of GDP. Simple and effective, this would promote additional competition in financial services and make us safer. If this solution seems too command-like, we could use financial incentives to accomplish the same end. For example, any bank larger than 0.4% of GDP can be required to maintain 110% of the usual capital

8 Indeed, it is the deposit insurance and the implicit government guarantee that gives us the right to force them to down-size.

9 Assuming BA of California would still be too big, its business could be subdivided between consumer banking and business banking. Too draconian, you wonder? If each piece of a future former Bank of America had assets equal to, say, 0.4% of GDP, it would be larger relative to the economy than were more than 99.9% of all U.S. banks in the mid 1970s.

requirement, at 0.5% the requirement could be 120%, at 0.6% 135%, and so on. Such a system is sure to limit the number of over-sized banks because the enhanced capital requirement will reduce return on equity. And, if any bank can find sufficient operating efficiencies or business opportunities above a certain size to make it attractive to be that large then they can afford to bolster their financial position with additional capital to protect the financial system (to protect us!).

Step 3: regulate any and all activities that have the potential to threaten the financial system. The idea that the credit-default-swap market could have grown from roughly U.S.$1 trillion to more than U.S.$60 trillion in less than a decade without any regulation at all is mind-boggling. (U.S.$60 trillion represents almost U.S.$200,000 for every man, woman ,and child in the U.S. It is also about equal to the world's GDP.[10]) Buyers and sellers of such swaps need to (a) report their activities and position sizes daily (or have brokers report them on their behalf), (b) have limits placed on the size of their positions, and (c) in the case of regulated companies (like banks and insurance), have capital requirements imposed on these off-balance-sheet assets/liabilities that are commensurate with the risks they entail. The commodities futures markets have operated under constraints like these since the 1920s. As a result, they have performed their useful economic function without ever threatening the financial system.[11]

Step 4: require that those who create risk have to share in that risk as well. That a mortgage originator – whether a broker or financial institution – need not care if the loan is repaid (because after pocketing the loan fees, the mortgage and attendant credit risk can be sold to other investors) is an open invitation to making bad loans. Best of all would be to ban the selling of credit risk (which was essentially the situation before 1970[12]), but, at the very least, we must mandate that those who make loans take responsibility for a substantial portion of any losses associated with them.

Sadly, the Dodd-Frank bill imposes a requirement in this regard that is no more onerous than existing practice. Regulators are required to establish rules within 270 days of the bill's passage that require securitizers of mortgages (and other assets) to retain "not less than 5%" of the credit risk on subprime (not qualified) mortgages and permits any such requirement to be waived entirely for prime mortgages. Apparently the authors of this section of the bill were unaware that in virtually all subprime mortgage deals, the issuers were already keeping the most subordinated 5% of a typical deal. The reasons: (1) the buyers of the investment-grade tranches could be persuaded that their investments were indeed investment grade only because the issuers promised to absorb 100% of the first 5% of the losses and (2) the issuers relished this arrangement because in return for offering this "protection" (to the investment-grade tranches), all of the excess interest (i.e., the difference between the high interest rates being earned on the subprime mortgages and the low interest rates payable on the investment-grade tranches) accrued to the benefit of the subordinated debt-holders. Until it finally blew up in 2007-2008, the annual returns earned on the 5% not sold to the public generally centered on 50%-60% per year. (No wonder Wall Street fell in love with this business.) In short, the retention requirement in the reform package does not go one millimeter beyond industry practice and it will, thus, in no way deter dangerous underwriting practices.

On the other hand, one can always hope that those writing the actual regulations will exploit a loophole in how the bill was phrased ("not less than 5%") to impose much stiffer requirements. The bill seems to allow (say) a 25% subordinated retention requirement – something that would certainly do the job.[13]

Step 5: stop the madness whereby average consumers are expected to figure out what the risks of certain financial arrangements are when even the sharpest financial minds cannot do so. Ban the issuance of complex retail financial products. (The reform legislation creates a Bureau of Consumer Financial Protection that seems to have the power to do this. Hopefully it will.) Either ban adjustable-rate mortgages altogether or qualify borrowers only if they can meet the maximum payment allowed under the ARM. After all, if the borrower may have to pay that much, is it not sensible to make sure she can afford to? Consider this: the deregulation of the financial system began in 1970. Steps were taken to reduce the protections for our financial system in every administration between then and 2008. Every single Fed Chairman and Treasury Secretary failed to see what was coming and most of them actively encouraged deregulation.[14] Virtually all leading bankers and investment bankers endorsed the process too. If all these experts could not figure out what these complex financial instruments were leading us towards, how was an ordinary consumer supposed to analyze and make decisions about them?

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10 Although the loss potential of those CDS were only a fraction of U.S.$60 trillion, it was great enough to cause the World's entire financial system to seize up in 2008.

11 Commodities futures are regulated by the Commodities Futures Trading Corporation (CFTC). CDS, interest rate swaps, and other derivatives have characteristics that are very similar to these instruments, yet in 2000 Congress explicitly rejected a proposal that would have regulated them in much the same way as futures.

12 It was not actually banned, but it simply was not done in any size.

13 If a lender keeps a 25% share of any security, they need only absorb 25% of any credit losses. However, if they are required to keep 25% of the security and it is subordinated, they would have to absorb 100% of the first 25% of losses. A 25% retention requirement with subordination would probably deter sloppy underwriting practices as much as a non-subordinated 50% requirement.

14 When CFTC Chairwoman Brooksley Born tried to regulate the derivatives market during the late 1990s, she was shot down by Fed Chairman Greenspan and Treasury Secretary Rubin. The late Edward Gramlich warned about the damage that subprime mortgages could inflict while serving on the Board of Governors of the Federal Reserve Board in the early 2000s. Those are the highest-ranking officials I am aware of that were on the right side of these questions, but they were, obviously, not high-ranking enough. (Every reader of this paper knew of Greenspan and Rubin, but the vast majority almost surely never heard of Born or Gramlich – at least until they began receiving belated recognition during the financial crisis.)

Rules to regulate by

Regulations exist to limit damage from negative externalities – hence speed limits, fire codes, and anti-pollution laws. Of course, these rules must be set sensibly – if not, they hamstring the economy. (A stagnant economy is excessive regulation's own negative externality!) A common-sense regulatory framework observes principles like these:

1) If there is no potential cost (or harm), do not regulate – if there are costs and benefits, regulate optimally (pay attention to the tradeoffs); but since it is hard to know for sure if there is any potential systemic danger: (a) err on the side of more regulation if you detect even a whiff of systemic danger (often this requires only a little more regulation) and (b) err on the side of less regulation when you are "certain" there is no systemic danger.
2) If there are costs and no potential benefits, forbid the activity.

How can we operationalize these principles? Earlier, when I suggested that the solution lies in the rear-view mirror, I was proposing that we replicate the regulatory structure and business practices that prevailed after the 1930s through the late 1960s. Assuming we will not revert entirely to the former system (if only because too many genies have escaped from too many bottles), we can nevertheless learn from (a) what was good and right and sound about the old system and (b) what went wrong over the past 35-plus years. In doing so, we can develop a set of rules that makes sense for the 21st Century.

Earlier I offered five steps for reforming the system that might be summarized as (a) no more too big to fail, (b) no more moral hazard, (c) no more system-threatening activities, (d) no more risk creation where someone other than you bears the risk, and (e) no more impossibly-complex financial instruments. I discussed all of this above, but thought a few illustrations of how certain specific activities might be regulated would prove helpful.

Futures, forwards, and hedging

When futures and forwards are used to hedge business risks, they encourage economic activity. Consider a U. S. manufacturer that agrees to purchase a component from a European supplier for €100, currently worth around U.S.$130. He is happy with that price and so is the European seller. The problem is that delivery is not going to happen for three months. If the $/€ exchange rate changes by 10% over that period, someone might find his profit wiped out. Locking in the exchange rate through the use of futures or forwards helps both parties. It reduces their risks, entails tiny transaction costs, and creates no additional risk for the financial system.[15]

In another example, managers of stock index mutual funds can help their performance hew more closely to the indices they are supposed to track by using stock index futures. A U.S. manager might keep 99% of the assets of her fund in the shares of the companies that are in the S&P 500 while maintaining a position equivalent to the other 1% in the form of "long" S&P 500 stock market futures. Each day, she monitors the net daily cash flows and, as the stock market is set to close, adjusts her exposure to the S&P 500 future accordingly. This way, she can remain extremely close to being exactly 100% invested at all times. The next morning, the futures trade can be reversed at the same time that the actual (and offsetting) trades in the 500 stocks are made. This arrangement makes the customers happy and entails very close to zero risk because (say), in the example where net money flowed into the fund, and the manager had purchased extra futures, if the value of the futures declines between the purchase on Day 1 and sale on Day 2, that loss will be offset by the fact that when the actual shares are purchased (on Day 2) they can be collectively bought for a lower price that almost exactly corresponds to the price decline in the futures position. The performance of the fund ends up exactly where it is supposed to be – namely, tracking the S&P 500.

In a third example, the benefits are not quite so unalloyed. The demand for most farm products is highly inelastic to price. A bountiful growing season that results in an oversupply of 10% might cause prices to drop 50%, while a 10% crop shortfall, might cause prices to double. In the first case, the buyer/manufacturer gains a windfall while the seller/farmer loses money. In the second case, it is the manufacturer who suffers as the farmer earns an abnormally high profit. Almost all sellers and buyers would be happy to give up the chance of an outsized profit in exchange for insuring against a loss. This is what futures contracts facilitate. Before the growing season, the farmer can sell his product forward, locking in a fair return while the manufacturer can buy that product forward, locking in a reasonable cost on the commodity he will be processing.

As described thus far, the agricultural example seems very much like the currency and stock futures examples – namely a transaction that lessens risks for both buyers and sellers. However, agricultural futures do nothing to eliminate a shortage if one arises. Indeed, if a high percentage of a crop has been sold forward, then there is even less marginal supply available to meet the inelastic demand for the commodity, and the price explosion can be larger than what would have occurred in the absence of futures. Still, most observers agree that agricultural futures confer more benefits than costs. And, just as with the manufacturing-currency and index-fund-stock-market examples, agricultural futures used as hedges do not increase the risk to the financial system.

Futures, forwards, and speculating

If futures and forwards for hedging purposes are going to exist, the market for them is likely to be more liquid (i.e., have narrower bid-ask spreads) if speculators are allowed to trade these instruments as well.

15 This is true provided the margin requirements are set properly – something that will be discussed later.

But speculators can pose systemic risks if their position sizes grow too large. The solution: establish sensible position limits (smaller for speculators than for hedgers), impose sufficient initial margin requirements, and make all participants mark-to-market every day. If these rules are calibrated correctly, no failure of any investor (or any group of investors) can threaten the system.

As noted earlier, regulated futures trading predates the Great Depression and no calamities have occurred under the aegis of the Commodity Futures Trading Commission (CFTC). Speculators are subject to heftier margin requirements than hedgers (the latter are also sometimes granted larger position limits than the former), both speculators and hedgers must mark to market every day (no exceptions!), and for 80-plus years there have been no meltdowns that had ramifications for the rest of the financial system or economy. Still, although there have been no systemic failures, two events over the past generation – the 1987 stock market crash and the 1998 Long-Term Capital Management Crisis – raised the specter of systemic risk.[16] The upshot is that I would use stricter criteria than the CFTC in setting initial margins. For bona fide hedgers (with adequate documentation), I believe the current criteria are just fine. But my inclination regarding speculators is to raise the requirements by between 50% and 100% from current levels.[17] And, of course, whatever requirements are imposed in the futures markets should be imposed in the forward markets as well.

Skeptics may wonder: why protect against the once in one-hundred-year disaster? My response to this takes the form of a series of questions:

- What is the plausible rationale in favor of exposing the system to such a disaster?
- Are investors speculating on the direction of commodity prices not getting enough "action" if their 50/1 leverage is capped at 25/1?
- What economic purpose is served by leverage ratios that might threaten the system? Better liquidity? (Why is it worth risking the system over this?)

I suspect that limiting the speculators to a 25/1 ratio would scarcely change their behavior. If I am wrong – i.e., if they traded moderately less, reducing market liquidity such that bid-ask spreads for hedgers would be a bit wider – I would be prepared to sacrifice that little bit of liquidity to protect the system against worst-case outcomes.[18] And, given the likely minuscule impact on trading costs, I would bet all those hedgers would agree with me as well.

Adjustable rate mortgages

Rephrasing a point I made earlier in the form of a question: why should anyone (ever) be allowed to borrow on terms that may adjust in a way that would render him/her unable to service the debt, even if his/her financial situation never deteriorated in the least?

Prior to 1978 there were scarcely any mortgage loans (in the U.S.) that failed to meet this standard and for most of that period the U.S. housing market did just fine (and the percentage of Americans that owned their own homes kept advancing). Does any reader have a problem with the level of mortgage defaults from 1945-1978?

Avoiding the last war

"The ordinary error of military sophistication is to be prepared to fight the last war."[19] With that in mind it will be shameful if we cannot devise a system that would have prevented the crisis of 2008. This means making sure that subprime mortgages and credit default swaps never again be allowed to inflict such damage on our economy.

Subprime mortgages

They were favored by the political left which loved the idea of mortgages for the poor and by the political right which believed that more home ownership would encourage more family and community stability. The mortgage industry and Wall Street could not get enough of the profits they generated and they certainly delighted the two-thirds of the public that owned their own homes, as (unbeknownst to them[20]) the explosion in subprime issuance helped push home prices ever higher – even as the poor souls who were not homeowners came to despair that they might ever be able to afford a house.

To be sure, a few analysts noticed that the post-2000 home-price inflation was by far the greatest in our history[21] and worried that the revaluation of home prices (relative to everything else) was unsustainable. A few grew downright bearish and issued warnings about a coming collapse in house prices and massive defaults on subprimes. The earliest of those warnings proved premature, but not for long. If that was all there was to what happened we could say "let us ban all subprime mortgages because they nearly destroyed our financial system and were a principal factor contributing to the worst recession in a generation." But that is not the whole story.

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16 While I am skeptical about the dangers it may have posed, some believe that the Hunt-Brothers' silver crisis of 1980 also posed a threat to the system.

17 I have never studied the question of position limits for speculators. However, there is something of a tradeoff between position limits and initial margin requirements.

18 To understand how little impact a(n unlikely) doubling or (even) tripling of bid-ask spreads would have, consider some representative round-trip bid-ask spreads in the listed futures market at this writing: for outright purchases or sales, T-bond futures are at 1/42nd of 1%; the Euro/Dollar exchange rate is at 1/130th of 1%, and S&P 500 futures are at 1/112th of 1%. When "rolling contracts" (a common activity) the spreads are one-half of the percentages mentioned for the Euro/Dollar and the S&P 500 and one-fourth of the percentage mentioned for T-bonds.

19 I believe I am quoting or paraphrasing Murray Kempton, the late newspaper columnist. Sadly, I have been unable to find Kempton's old columns or any other source for this quote.

20 I assume I am not the only one who knows many homeowners who believed the extraordinary increase in the value of their homes was the result of their financial acumen.

21 It was the greatest in relation to the general inflation rate.

The problem with subprime was not simply that people were allowed to borrow with less-than-the-usual 20% down or with income that was not up to the historical standard of (roughly) three times the monthly payment, or that their credit histories were checkered. It was all of that combined, plus the fact that in many cases the borrower was no longer required to supply documentation to the originator of the loan (because the originator did not care, since he was not the lender) and, most importantly, the borrower could begin with eminently affordable "teaser" payments – most commonly for two years (albeit occasionally for three or five years). The problem with the teasers, of course, was that after the initial period, the loan would become fully amortizing, necessitating a huge rise in the monthly payment that the borrower almost certainly would not be able to afford.

The entire surge in subprime lending was built on a premise of perpetually rising home prices facilitating refinancing whenever the borrower was threatened with actually having to service his loan (in a fully amortizing way). The way you kept your monthly payment low was by refinancing your mortgage when the payment ballooned at the two-year mark – gaining a new two-year interval with low teaser payments. Your mortgage broker was happy (another round of fees), the investment banker was happy (another round of subprime mortgage-backed securities issuance), and you were happy (extracting excess equity when your house increased in price 20% over that two-year period). However, when and if either of the following happened – (1) a decline (even a very small decline) in home prices, or (2) rising mortgage rates (as little as ¼% would suffice if home prices were flat) – the cycle could not be extended; you would simply not be allowed to refinance. And, sooner or later, one of those two events was bound to happen.

Is there a place for subprime? I would say "yes." Occasional relaxation of underwriting standards is acceptable, provided there are reasonable safeguards. For example:

1. Any one standard (but not more than one standard) that is normally employed in prime mortgage lending may be relaxed, up to a point. For instance: down payments may be less than 20%, but not less than 5%, or income may be less than three times the monthly carrying cost, but not less than 2.5 times the carrying cost, or the FICO score may be below 660 but not below 620, or there could be a scoring system that allows relaxation of more than one factor, but not to the degree described above. So, for example, 15% down and 2.8 times income and a FICO score of 650 might be an acceptable combination.
2. But, on any such loan, the maximum monthly payment cannot rise for at least the first five years and is then limited to a maximum of 115% of the initial payment, and the lender must retain at least a 40% subordinated interest in the mortgage.[22]

Rules like this would limit volumes to a very small fraction of their prior peak levels and return subprimes to the special-case status where they are used by financial institutions to help them dispose of foreclosed property and/or to help a carefully selected small number of almost-credit-worthy borrowers (who seem to be good candidates for becoming credit-worthy) enter the realm of homeownership.

Credit default swaps

Is there any possible rationale for their existence? Let us see.

You own a Greek Government bond. You believe that government has been profligate and wish to eliminate your exposure. The old-fashioned solution – simply selling the bond – is evidently not sophisticated enough for the modern wizards of finance. These days, we have two choices: (1) we can sell the bond or (2) hedge our position using a CDS. What is the difference? Option 1 is simple (it is what worried investors have done since time immemorial). Option 2 is more complicated and ends up increasing the amount of money being wagered on this troubled situation. After all, if you plan to sell Greece short via a CDS, someone else must buy it!

Strictly speaking, the use of a CDS to hedge Greece does not increase the amount of betting on Greece's creditworthiness. But it has increased (rather dramatically) the total amount of betting taking place in the system that is tied to developments in Greece. What has happened is that the original bet (your bet on the Greek bond) has been supplemented by two other bets: (1) that if the price of Greek debt continues to spiral downward, the investor who sold you protection on Greece will make good on what he owes you, and (2) the investor who you bought protection from is betting that if Greek debt recovers, you will make good on what you owe him. Before there was one possible default (Greece defaulting on its debt to you); now there are three possible defaults; Greece defaults, the seller of protection to you defaults, or you default to the seller of protection.

Proponents of CDS contend that these instruments provide risk reduction by creating vehicles for hedging credit risk. But hedging a long position with a CDS can never be safer than simply selling the long position because when you sell the long position you have eliminated all of your exposure whereas if you "protect" your position using a CDS you may still lose money if the bond drops in price and the seller of protection cannot make good on his obligation to you.

Since I suspect this genie is also out of the bottle, I will hold my nose and propose what should be done if the political community is unwilling to ban CDS outright.

1. Only permit listed CDS – subject, of course, to the same type of position-size, margin and mark-to-mark requirements discussed above.

22 Note that this is higher than the 25% subordinated interest that I suggested earlier for prime mortgages.

2. CDS should be generic only. No individual issuers below the country level. (So there might be a contract for a standardized Greek Government bond,[23] but not for any private Greek issuer. If you do not like that non-governmental Greek issuer, just sell the bond.)
3. If desired, certain other categories might be established tied to well-established indices (i.e., the spread between Moody's seasoned Aaa and Baa bonds as published in the H.15 release of the Federal Reserve Board).

Still, the fact remains that, except for those who profit from the trading of these instruments, almost everyone would be better off if CDS were simply abolished.

Liquidity, transparency, bid-ask spreads, profits, greed and bailouts

To paraphrase Ralph Waldo Emerson, a foolish consistency would be a hobgoblin for greedy minds. Whenever there is a proposal to reduce the maximum-allowed leverage on listed commodity futures, there is fierce opposition from the industry – citing, among other things, that this would hurt the liquidity of those markets. (Footnote 18 showed why this concern is absurd.) But attempts to standardize and list credit default swaps on commodities exchanges – something that would greatly increase their liquidity – is met with even fiercer opposition. It seems that concerns about liquidity are not so important when so much money is at stake.

Round-trip bid-ask spreads in "investment-grade" subprime mortgage CDS were 1% or so (or 40 times the spread on listed T-bond futures) before there was a crisis of any kind. By early 2008 – i.e., after the subprime market had plummeted, but still 7-8 months before the general meltdown of the financial markets – spreads were routinely 20% (800X the spread on T-bonds)! To the bitter end, Wall Street was making massive profits trading these instruments.[24] Of course, the reason the spreads were so wide is that trading is unlisted and there is no place where buyers and sellers can see, with any degree of reliability, where the market really is.

The secrecy of this market rendered it illiquid which was the reason both for (a) the immense profits generated and (b) the total lack of transparency that caused the financial markets to seize up in the autumn of 2008. For a decade, Wall Street coined money trading what Warren Buffett correctly described as "financial weapons of mass destruction," paid that money out to their employees (i.e., themselves) and, as a result of those payouts, did not have remotely enough capital on hand when everything fell apart. And so, to avoid an even bigger calamity, the "public" – the very group that was going to suffer job losses in the millions and GDP losses in the hundreds of billions – had to bailout the institutions that created all that destruction, while the people responsible walked away with unprecedented wealth.

What's wrong with this picture?

Concluding remarks

The deregulation of the financial system unleashed forces that ultimately threatened that system and the economy that depends on it. The creativity of financial engineers produced unprecedented wealth for them and extraordinary dangers for everyone else. This is not an acceptable state of affairs. Government and the monetary authority must protect the financial system (or at least try to) for an unbridled financial system makes about as much sense as a road system without traffic signals and speed limits. Allowing financial entrepreneurs free rein produces nothing in greater quantity than moral hazard.

To solve this problem and prevent future system-threatening financial crises, we would be well advised to adopt regulations that are as effective as those that existed from the end of the Great Depression until about 1970. They need not be identical to those earlier regulations but they do have to eliminate the threats posed by moral hazard, "too big to fail," mind-bendingly complicated financial instruments, and anything else that exists (or might be developed!) that can threaten the system.

This paper has detailed a number of specific recommendations which, if combined with the recently-enacted financial reform legislation, should suffice. Of course, future financial innovation could pose new kinds of threats, but there should not be any that cannot be contained. All that is needed is for the regulators to remain mindful (in light of what happened beginning with the demise of the Savings and Loan industry and culminating in the Great Meltdown of 2008) that the integrity of the financial system must take precedence over the desires of the individual actors operating inside that system.

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23 Indeed, there can be a Greek Bond Future that is just like the U.S. Treasury Bond Future – except that the deliverable bonds would be Greek, not U.S.

24 Yes, a number of Wall Street firms lost money on their subprime mortgage holdings, but the trading was always profitable.

PART 2

Enhancing the Transparency of Bank Fair Value Reporting

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Abstract

Following the financial crisis, the application of fair value accounting to banks' financial reporting has received considerable attention. Despite this controversial practice, this paper suggests that an important aspect of fair value accounting has been neglected. This paper argues that the complex framework under IFRS governing the reporting of fair value gains and losses impairs the ability of ordinary investors to understand the impact of such gains and losses on banks' reported income. It reviews the accounting framework, including both the October 2008 relaxation of reclassification options under the existing IAS 39 standard, and the IASB's phased replacement of IAS 39 with IFRS 9. This paper draws on the recent financial statements of large U.K. banks to illustrate the complexities. The paper concludes that IFRS 9 brings welcome simplification. However, the new standard reinforces the place of fair value measurement in banks' financial reporting and still leaves obstacles to understanding the impact of fair value movements on banks' reported income.

Historically, banks' financial reporting practices were dominated by the application of conservative, amortized cost accounting principles to measure the traditional deposit-taking and lending value adding activities in which they specialized. However, the years prior of the financial crisis were characterized by increasing deregulation, financial innovation, greater use of wholesale funding, and complex and sophisticated risk management and transfer funding vehicles. Banks' greater use of wholesale funding, complex credit instruments, and derivatives meant a much higher proportion of their value adding activities arose from these intermediation services, both for proprietary trades and on behalf of customers. These were measured instead using market-based fair value accounting principles.

Even for large retail-focused banking groups, between a third and a half of their balance sheet assets and liabilities are measured at fair value.[1] Movements in the fair value of these instruments may, therefore, have a significant impact on reported income. However, as fair value is a relatively subjective concept, and focuses on 'output measurement' rather than 'input measurement,' it provides little insight to enable users of financial statements to establish the value added performance arising from those activities, particularly given the often opaque nature of the financial instruments.[2]

These issues should be of concern to public policymakers, researchers, and analysts for a number of reasons. First, the subjective aspects of reporting fair value may lead to significant disparities in value over time due to measurement errors. Second, the changes in fair value of relevant instruments may mislead investors in assessing the 'earned' performance of management given that these changes may be due to economic factors outside management control. Third, they may cause regulators and credit analysts to make erroneous inferences concerning the 'unbiased' capital ratios of banks for capital adequacy purposes.

The value relevance and reliability of fair value accounting principles to the measurement of various financial instruments in banks' financial statements has, therefore, received considerable attention in the wake of the financial crisis. The debate has focused on several major themes:

- The relationship between fair value accounting and "procyclicality."
- The difficulties of fair valuing assets and liabilities in the absence of transparent market prices.
- The counter-intuitive gain that arises from a decline in the fair value of a bank's liabilities following a downgrade of its own credit rating.

This paper explores another important aspect, namely the illusory versus real cash flow impact of fair value changes on banks' reporting of position and performance. Greater use of fair value accounting leaves banks' reported income vulnerable to unrealized movements in fair value that may bear no relation to underlying changes in cash flow. Transparent reporting of the cosmetic versus underlying real cash flows associated with 'risk exposures' that may underlie the apparent impact of such movements on reported income is, therefore, particularly important. Yet this paper documents how the complex accounting treatment of fair valued financial instruments under International Financial Reporting Standards (IFRS) leads to opaqueness and obscurity in banks' financial reporting. It argues that this complex accounting framework impairs the ability of ordinary investors to understand the impact of fair value changes on overall reported net income, comprehensive income, and capital flows, and understand how the main general purpose financial statements articulate with each other.[3] The paper analyses the most recent financial statements of the largest U.K. banks to exemplify key points.[4]

There are several complexities to fair value reporting that may affect users of financial statements. There are differences between the standard balance sheet itemization of assets and liabilities and their itemization under IAS 39.[5] Further, there are differences under IAS 39 in how any gains and losses between the various types of financial instrument are captured in the financial statements. While gains and losses on certain instruments are recognized in profit or loss, those on others are taken to equity via the statement of comprehensive income.

The impact of real versus arbitrary and cosmetic accounting policy changes on reported income and capital has been obfuscated by the vagaries associated with poor accounting quality in bank reporting, with variations between banks in GAAP application and disclosure policies. To achieve a comprehensive analysis of fair value movements during a reporting period, investors have to piece together information from the profit and loss account and statement of comprehensive income, and carefully review disclosures contained in the notes to the accounts. Even then, a lack of disclosure by some banks makes it difficult to calculate, for a given reporting period, the overall contribution to income of unrealized fair value gains and losses.[6]

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1 Based on the analysis of recent financial statements of the largest U.K. banking groups in the paper. An analysis by UBS (2009) based on the aggregate 2008 balance sheet of the top 15 European banks suggested approximately 50% of aggregate assets and 35% of aggregate liabilities were at fair value (though with significant variation between banks with large investment banking activities and more retail-focused banks).

2 The analysis of recent financial statements of the largest U.K. banking groups in the paper finds that a majority of their fair valued assets and liabilities are Level 2 instrument.

3 Prior research on IFRS adoption by European banks [Gerhardt and Novotny-Farkas (2010)] tends to assume that investors either fully comprehend the components of bank earnings and/or understand the operation of markets in processing this information efficiently. By contrast, this article focuses on the average investor, who may not necessary be expected to fully comprehend the subtleties of bank accounting and measurement outlined here.

4 All the large U.K. banks report under International Financial Reporting Standards as endorsed by the European Union.

5 One of the relevant international accounting standards, along with IFRS 9, which will replace it, and IFRS 7 Financial Instruments: Disclosures.

6 This is despite the fact that one of the main principles of IFRS 7 is: "An entity shall disclose information that enables users of its financial statements to evaluate the significance of financial instruments for its financial position and performance." (IFRS 7, Paragraph 7)

The reporting framework is further complicated by recent changes to relevant accounting standards. These divide into shorter-term and longer-term changes, which arguably pull in different directions. During the second half of 2008, the International Accounting Standards Board (IASB) relaxed the standards governing the reclassification of fair valued financial instruments. However, the IASB's longer-term project is the replacement of IAS 39 with a new standard, IFRS 9 Financial Instruments. In contrast to the additional options allowed by the October 2008 amendments to IAS 39, IFRS 9 is intended to improve and simplify the classification framework. In November 2009, just over a year after the October 2008 changes, the IASB published the first chapters of IFRS 9. These cover the classification and measurement of financial assets.

This paper argues that the IASB's relaxation of the rules on the reclassification of fair valued financial instruments allows banks too much latitude to exercise discretion over the impact of fair value movements on headline earnings.

IFRS 9 is intended to address many of the concerns and criticisms leveled at IAS 39. It simplifies the classification framework for financial instruments, places greater restrictions on the reclassification of instruments, and narrows the scope of gains and losses taken through other comprehensive income rather than profit or loss. However, IFRS 9 also makes fair value the default measurement basis for valuing financial instruments, with instruments valued at amortized cost only if they meet specific criteria. This may further disconnect banks' reported income from movements that reflect genuine changes in cashflow. And, it leaves open the disclosure problems that make it difficult to calculate the composition and contribution of fair value movements to reported performance.

Consequently understanding the full impact of these apparently cosmetic GAAP changes on the allocation of bank assets between fair value and amortized cost, the consequential impact of changes in primary risk exposure on the measurement of fair value, and its consequences for real versus illusory gains on reported profit and capital, becomes an important issue.

Types of fair value assets and their accounting treatment

This section provides a brief technical overview of the institutional background required to understand our subsequent analysis of GAAP relevant to bank reporting. Readers who are familiar with this topic can ignore this section.

Under IFRS, a so-called "mixed attributes" model is used to value assets and liabilities on banks' balance sheets based on their initial recognition.[7] Financial assets and financial liabilities are measured on an ongoing basis either at amortized cost[8] or at fair value[9]:

- Loans and advances to, and deposits from banks and customers, and held-to-maturity (HTM) investments[10] are generally accounted for at amortized cost using the effective interest method less any impairment losses (after initial recognition at fair value plus any directly attributable transaction costs).
- In contrast, trading securities, financial instruments designated at fair value, and available-for-sale investments (including all derivatives, whether held for trading or hedging) are measured at fair value.

Gains and losses on assets and liabilities recorded at fair value are accounted for differently from those recorded at amortized cost. Only realized gains are recognized on assets valued at amortized cost, while deposits are always valued at their face value[11]. Reductions in the value of assets recorded at amortized cost result in provisions through the income statement and corresponding write-downs on the balance sheet.[12] In contrast, under fair value accounting, unrealized gains and losses are recognized.

There are several characteristics of fair value accounting measurement principles that affect the transparency of banks' financial statements:

- Differences between the financial assets and liabilities by category as defined in IAS 39 and by balance sheet heading.
- Differences under IFRS in how any gains and losses between the various types of financial instrument are captured in the financial statements.
- Problems combining the gains and losses across the various types of financial instrument into a comprehensive overview of the impact of fair value movements on a bank's results during a given reporting period.

7 This analysis applies only to what is generally identified as 'financial instruments.' Any asset that is not identified as a financial instrument would not be subject to the measurement, classification, and recognition issues discussed below (though in the case of banks, most of the assets on their balances sheets are financial rather than non-financial assets).

8 The amortized cost of a financial asset or financial liability is defined in IAS 39 as "the amount at which the financial asset or financial liability is measured at initial recognition minus principal repayments, plus or minus the cumulative amortization using the effective interest method of any difference between that initial amount and the maturity amount, and minus any reduction (directly or through the use of an allowance account) for impairment or uncollectibility." (IAS 39, Definitions, Paragraph 9)

9 Fair value is defined in IAS 39 as "the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction." (IAS 39, Definitions, Paragraph 9)

10 IAS 39, Paragraphs 45, 46

11 Under IAS 39, the fair value of demand deposits cannot be less than their face value and does not change with changes in interest rates: "The fair value of a financial liability with a demand feature (e.g. a demand deposit) is not less than the amount payable on demand, discounted from the first date that the amount could be required to be paid." (IAS 39, Paragraph 49)

12 Under historical cost accounting, impaired assets are written down on the balance sheet to their recoverable value with impairment provisions made through the income statement. The impairment loss is the difference between the carrying value of the loan and the present value of the estimated future cash flows discounted at the loan's original effective interest rate. Provisions are currently made on an incurred loss basis, though the IASB recently consulted on moving to an expected loss model (Financial instruments: amortized cost and impairment, exposure draft ED/2009/12, November 2009).

Comparing balance sheet headings with IAS 39 itemization of assets and liabilities

Financial instruments that are potentially subject to fair value measurement are classified as belonging to one of the following categories: held-for-trading, financial instruments designated at fair value, available-for-sale, and derivatives. In addition, those derivatives that qualify under IAS 39 as a hedging instrument in a qualifying hedge are further classified as being either a fair value hedge or a cash flow hedge.[13]

Looking at each of the main categories, RBS, for example, in its accounting policies defines an asset as "**held-for-trading**" if it is "acquired principally for sale in the near term, or forms part of a portfolio of financial instruments that are managed together and for which there is evidence of short-term profit taking, or it is a derivative (not in a qualifying hedge relationship)."[14]

Banks designate financial assets and liabilities at "**fair value through profit or loss**" on initial recognition in the following circumstances: eliminates or significantly reduces a measurement or recognition inconsistency that would otherwise arise from measuring the assets and liabilities or recognizing gains or losses on different bases, applies to a group of financial assets and/or financial liabilities that are managed on a fair value basis, and where the assets and liabilities contain embedded derivatives that significantly modify the cash flows arising under the contract and would otherwise need to be separately accounted for.[15]

The main types of financial assets designated by banks at fair value through profit or loss are assets backing insurance contracts and investment contracts issued by their life insurance businesses. According to the banks, fair value designation significantly reduces the measurement inconsistency that would arise if these assets were classified as "available-for-sale." Fair value designation allows changes in the fair value of these assets to be recorded in the income statement along with the changes in the value of the associated liabilities.[16]

"**Available for sale**" is used as a residual category for financial instruments. Financial assets can be designated as available-for-sale on initial recognition, though an entity applying IAS 39 for the first time is permitted to designate a previously recognized financial asset as available for sale.[17] RBS defines the category as follows: "Financial assets that are not classified as held-to-maturity; held-for-trading; designated as at fair value through profit or loss; or loans and receivables, are classified as available-for-sale."[18]

In some cases, there is not a direct match between the categories of financial instrument as defined in IAS 39 and assets and liabilities by balance sheet heading.[19] For example, looking at HSBC's 2009 financial statements[20]:

Balance sheet headings	IAS 39 categories				
	Held for trading	Held-to-maturity securities	Available-for-sale securities	Derivatives designated as fair value hedging instruments	Derivatives designated as cash flow hedging instruments
Assets					
Trading assets	X				
Derivatives	X			X	X
Financial investments		X	X		
Liabilities					
Trading liabilities	X				
Derivatives	X			X	X

Notes:
1 Amortized cost "held-to-maturity securities" category highlighted to differentiate from the other IAS 39 categories, all of which are measured on a fair value basis.
2 There may be similar complexities in matching IAS 39 amortized cost assets and liabilities on to balance sheet headings, notably "loans and receivables" and "financial assets and liabilities at amortized cost."

Sources: IASB, HSBC Holdings plc Annual Report and Accounts 2009, authors' analysis

Table 1 – Balance sheet headings and IAS 39 categories

13 Fair value hedges and cash flow hedges are defined in IAS 39 as follows: fair value hedge [a hedge of the exposure to changes in fair value of a recognized asset or liability or an unrecognized firm commitment, or an identified portion of such an asset, liability, or firm commitment, that is attributable to a particular risk and could affect profit or loss. (IAS 39, paragraph 86 (a))] and cash flow hedge [a hedge of the exposure to variability in cash flows that (i) is attributable to a particular risk associated with a recognized asset or liability (such as all or some future interest payments on variable rate debt) or a highly probable forecast transaction and (ii) could affect profit or loss. (IAS 39, paragraph 86 (b))].
14 RBS Annual accounts 2009, Accounting policies, 15, financial assets, p. 252
15 IAS 39, Paragraphs 9, 11A
16 See for example RBS and Lloyds Banking Group, both of which have large insurance operations.
17 IAS 39, paragraph 105
18 RBS Annual accounts 2009, Accounting policies, 15, financial assets, p. 252
19 When an entity is required under IFRS 7 to make disclosures by class of financial instrument, it shall "group financial instruments into classes that are appropriate to the nature of the information disclosed and that take into account the characteristics of those financial instruments." An entity shall "provide sufficient information to permit reconciliation to the line items presented in the statement of financial position" (Paragraph 6). However, the application guidance to IFRS 7 states that the classes described in paragraph 6 are "determined by the entity and are, thus, distinct from the categories of financial instruments specified in IAS 39 and IFRS 9" (Appendix B, Paragraph B1). Paragraph 8 of IFRS 7 on the statement of financial position states that the carrying amounts of each of the following categories (i.e. the main categories of financial assets and liabilities), as specified in IFRS 9 or IAS 39, "shall be disclosed either in the statement of financial position or in the notes" (Paragraph 8). This hardly makes for easy reading and interpretation. However, the practical outcome of the interaction of IAS 39 and IFRS 7, based on the financial statements of the banks studied for this paper, is that there may be significant differences between the categories of financial instrument as defined in IAS 39 and assets and liabilities by balance sheet heading.
20 HSBC Holdings plc, Annual Report and Accounts 2009, Note 15 Analysis of financial assets and liabilities by measurement basis.

- Assets and liabilities that are "held for trading" under IAS 39 are split between "trading assets," "trading liabilities," and "derivatives" on the balance sheet.
- Conversely, "derivatives" on the balance sheet are split three-ways between assets and liabilities "held for trading," "derivatives designated as fair value hedging instruments," and "derivatives designated as cash flow hedging instruments" under IAS 39.
- "Financial investments" on the balance sheet include both amortized cost "held-to-maturity securities" and fair value "available-for-sale securities" under IAS 39.

Fair value recognition in profit or loss versus other comprehensive income

Further, there are differences in treatment under IFRS in how any gains and losses between the various types of financial instrument are classified in the financial statements. Some movements in value are recognized in profit or loss (income statement) while others are taken directly to equity via the statement of comprehensive income.[21]

Financial instruments are classified at fair value through profit or loss where they are trading securities or where they are designated at fair value through profit or loss by management. In contrast, gains and losses arising from changes in the fair value of investments classified as "available-for-sale" are recognized directly in equity, until the financial asset is either sold, becomes impaired, or matures, at which time the cumulative gain or loss is recognized in the income statement.

The recognition and classification of derivatives that are permitted under IFRS add further to the complexity. Gains and losses arising from changes in the fair value of a derivative are recognized as they arise in profit or loss unless the derivative is specified as being the hedging instrument in a qualifying hedge. In a fair value hedge, the gain or loss on the hedging instrument is recognized in profit or loss. In a cash flow hedge, the effective portion of the gain or loss on the hedging instrument is recognized directly in equity. The ineffective portion is recognized in profit or loss.

Table 2 summarizes the major treatments upon initial recognition.

	Valuation changes captured in:	
	Income statement	Equity (OCI)
Fair value		
Assets		
Marketable debt securities held for trading ('HFT')	X (3)	
Financial instruments designated at fair value	X	
Derivatives designated as fair value hedging instruments	X	
Derivatives designated as cash flow hedging instruments	X (4)	X (4)
Available-for-sale securities ('AFS')	X (5)	X (5)
Liabilities		
Trading liabilities and other financial liabilities designated at fair value	X	

Notes:
1 OCI = other comprehensive income.
2 Fair value changes taken through the income statement are mainly, though not exclusively, captured by banks as part of their net trading income.
3 Assets and liabilities held for trading includes derivatives held for trading.
4 In a cash flow hedge, the effective portion of the gain or loss on the hedging instrument is recognized directly in equity. The ineffective portion is recognized in profit or loss.
5 Gains and losses arising from changes in the fair value of investments classified as "available-for-sale" are recognized directly in equity, until the financial asset is either sold, becomes impaired, or matures, at which time the cumulative gain or loss is recognized in the income statement.
6 "Loans and receivables" and "held-to-maturity investments" are measured at amortized cost using the effective interest method less any impairment losses. Impairment losses are recognized through provisions in the income statement.
7 The fair value of demand deposits cannot be less than their face value and does not change with changes in interest rates.
8 In October 2008, the IASB issued amendments to IAS 39 and IFRS 7 that would permit the reclassification of some financial instruments (see the following section of the paper).

Sources: IASB, authors' analysis

Table 2 – Initial measurement bases for different classes of bank assets and liabilities

Overview of fair value gains and losses

A third problem that increases the opacity of bank reporting is a lack of disclosure on the composition of fair value gains and losses. It is difficult, if not impossible, to bring together the fair value gains and losses across the various types of financial instrument into a comprehensive overview of the impact of fair value movements on a bank's results during a given reporting period.

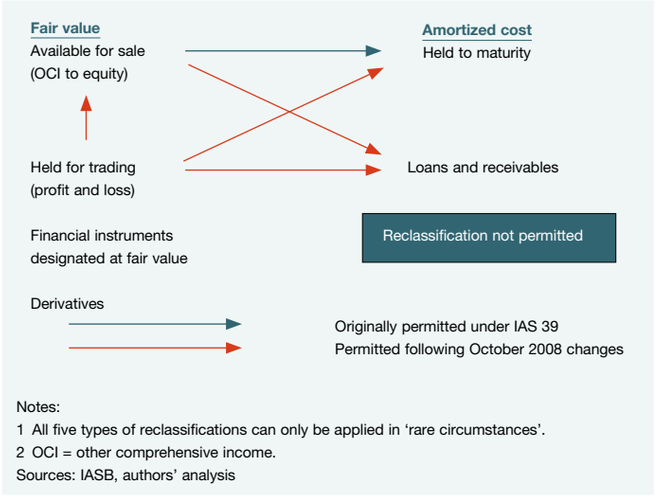
Investors and analysts would find it useful to have a comprehensive overview of changes in fair valued financial instruments across both the income statement and statement of comprehensive income. Unfortunately, the way in which relevant data is captured in the income statement does not facilitate this form of analysis. Fair value changes taken through the income statement are mainly, though not exclusively, captured by banks under the income statement item "net trading income." This comprises both: gains and losses from changes in the fair value of financial assets and financial liabilities held for trading, and the related interest income, expense, and dividends generated by the instruments. In other words, the net cash flow generated by the various fair valued

21 The income of reporting entities under IFRS is broken down between (a) the income statement (profit and loss account), and (b) the statement of total comprehensive income. Profit for the year, the bottom line of the income statement, is taken to the statement of total comprehensive income as its top line. Items not recorded in the income statement are captured in the statement of total comprehensive income as "other comprehensive income." Other comprehensive income is added to profit for the year to form total comprehensive income, the bottom line of the statement of total comprehensive income. Total comprehensive income is then taken to the statement of changes in equity.

financial instruments is not separated from the non-cash impact of unrealized changes in value.[22]

Some banks show as a separate item within the income statement "Net income from financial instruments designated at fair value".[23] However, this item suffers from the same problem of disentangling movements in fair value from the related interest income, expense, and dividends generated by the instruments.

In summary, bank classifications of various identified types of assets are subject to a range of complex measurement and classification principles. These can cause significant confusion for readers of banks' accounts in seeking to separate value creation from the effects of valuation. Further, the mixed measurement system limits the ability to understand the sources of market and operational risks that might drive underlying cash flows and capital allocation decisions. In the next section, we discuss recent developments in IFRS which bear upon this problem.



Notes:
1 All five types of reclassifications can only be applied in 'rare circumstances'.
2 OCI = other comprehensive income.
Sources: IASB, authors' analysis

Figure 1 – Reclassifications permitted following October 2008 changes

Recent changes in relevant accounting standards

In the wake of the financial crisis, the accounting standards that currently regulate the measurement principles affecting the reported fair value gains and losses on financial instruments are being extensively revised. These divide into shorter-term and longer-term changes, which arguably pull in different directions.

In October 2008, under intense lobbying from banks and governments, the IASB relaxed the provisions within IAS 39 governing the reclassification of fair valued financial instruments. As we show below, these changes, although justified as helping banks improve their capital adequacy levels, also led to further discretionary behavior by banks.

The IASB's longer-term objective is to replace IAS 39 with a new standard. In November 2009, just over a year after the reclassification changes, the IASB published the first part of IFRS 9 Financial Instruments, the standard that will replace IAS 39. This first part of IFRS 9 covers the classification and measurement of financial instruments. IFRS 9 brings improvements to the quality of banks' financial reporting; however, as we argue below, important issues remain outstanding.

Reclassifications permitted under IAS 39 since October 2008

At the height of the financial crisis, the IASB faced political and industry pressure to relax its reclassification of the measurement basis of various types of "toxic" bank assets whose complex structures created significant market asymmetry.

Previously, European banks reporting under IFRS could not avoid the reporting of fair value losses from trading assets whose market values were particularly sensitive to the negative impact of the crisis. This was because IAS 39 unexceptionally required that "an entity shall not reclassify a financial instrument into or out of the fair value through profit or loss category while it is held or issued" (Paragraph 50). By contrast, U.S. GAAP permits such changes as circumstances allow. Commercial banks outside the U.S. identified this restrictive rule, which forced them to report, ceteris paribus, lower profits and lower regulatory capital than their U.S. competitors, as being a potentially severe disadvantage in global capital markets, particularly during the crisis. Bank representatives lobbied intensely for the introduction of a reclassification option into IAS 39 along the lines of that already required by U.S. GAAP.[24] After intense

22 In its provisions for the statement of comprehensive income, IFRS 7 lists the items of income, expense, gains, or losses that an entity shall disclose "either in the statement of comprehensive income or in the notes" (Paragraph 20). These include net gains or net losses on the main categories of financial instrument (Paragraph 20(a)). Paragraph 21 requires disclosure of the measurement basis (or bases) used in preparing the financial statements and the other accounting policies used that are relevant to an understanding of the financial statements. According to the IFRS 7 application guidance (IFRS 7 Appendix B), for financial instruments, such disclosure may include "how net gains or net losses on each category of financial instrument are determined (see paragraph 20(a)), for example, whether the net gains or net losses on items at fair value through profit or loss include interest or dividend income" (Paragraph B5(e)). These provisions and guidance might be interpreted in various ways. However, as the examples above illustrate, whatever the provisions of IFRS 7, there remains a lack of clarity in banks' financial statements on the composition and impact of fair value gains and losses on reported income.

23 Under IFRS 7, the categories of financial instruments for which entities are required to disclose the carrying amounts, either in the statement of financial position or in the notes, include: financial assets measured at fair value through profit or loss, showing separately (i) those designated as such upon initial recognition and (ii) those mandatorily measured at fair value in accordance with IFRS 9 (IFRS 7, Paragraph 8(a)); and financial liabilities at fair value through profit or loss, showing separately (i) those designated as such upon initial recognition and (ii) those that meet the definition of held for trading in IAS 39 (IFRS 7, Paragraph 8(e)).

24 Laux and Leuz (2009) argue that there is anecdotal evidence that some prominent U.S. banks made use of the opportunity permitted under U.S. GAAP (SFAS 115, see below) to 'transfer' securities from the trading or available for sale category into the held to maturity category (i.e., to suspend fair value measurement of the respective assets).

lobbying, especially following the collapse of Lehman Brothers, the political situation for the IASB changed. Since banks with significant counterparty risk to Lehman Brothers faced the risk of reporting substantial losses, and, thus, a severe decrease in their regulatory capital, for the third quarter of the financial year 2008, politicians substantially increased the pressure of the IASB to alter IAS 39 in a way that allowed banks to reduce their reported exposure to those credit-crunch induced losses.[25]

In October 2008, the IASB issued amendments to IAS 39 and IFRS 7 that permit the reclassification of some financial instruments. The amendments to IAS 39 introduced the possibility of reclassifications for companies applying IFRSs equivalent to those already permitted under US GAAP[26] in "rare circumstances." Companies reporting according to IFRSs were able to use the reclassification amendments for reporting periods ending on or after July 1 2008.

The amendments to IAS 39 permit non-derivative held-for-trading (HFT) and available-for-sale (AFS) financial assets to be reclassified in particular situations. The original IAS 39 had allowed the reclassification out of the fair valued AFS category into the amortized cost HTM category only (Paragraph 54). The October 2008 amendment permits the reclassification of non-derivative financial assets (other than those designated at fair value through profit or loss on initial recognition) out of the fair value through profit or loss category in particular circumstances, and the transfer of assets from the available-for-sale category to the loans and receivables category.

The October 2008 amendments effectively introduced four additional types of reclassifications:

- Fair valued AFS assets can also be reclassified into the amortized cost L&R category.[27]
- Fair valued HFT assets can be reclassified into the: fair valued AFS category, amortized cost HTM category, or amortized cost L&R category.[28]

Following the October 2008 amendments, Figure 3 shows that there are now five possible reclassifications of assets measured at fair value, i.e., after initial recognition. The changes do not allow the reclassification of any assets for which IAS 39's fair value option is used, or the reclassification of derivatives. Transfers must be made at fair value, which also subsequently becomes the instrument's new cost or amortized cost.

While all five types of reclassifications can only be applied in 'rare circumstances' (Paragraphs 50B, 54), they differ in their accounting consequences.

Overall, there are three different effects on measurement which can be delineated by their impact on assets, equity, and net income/other comprehensive income.

1. First, reclassifications out of the fair value HFT category into the amortized cost HTM or L&R category affect both net income and equity, because fair value gains and losses cease to be recognized in profit or loss and, thus, in equity.
2. Second, reclassifications out of the HFT into the AFS category affect only net income and not equity (OCI), because fair value gains and losses are still considered in the revaluation reserve as part of an entity's equity (and OCI), but they are no longer shown in profit or loss.
3. Third, reclassifications out of the AFS category into the L&R or HTM category affect only equity (OCI) and not net income because fair value gains and losses have previously not been considered in the income statement, but only in the revaluation reserve as part of an entity's equity (and OCI).[29]

The replacement of IAS 39 with IFRS 9

Ironically, despite the intense pressure for the changes at the height of the crisis, the relaxation of the IAS 39 reclassification rules will only be temporary. The IASB is currently in the process of replacing IAS 39 with a new standard IFRS 9 that, inter alia, introduces new provisions on asset reclassification.

Concerns over the complexity of IAS 39 have been evident ever since the European Union first proposed to adopt international financial reporting standards for listed companies. The IASB and U.S. Financial Accounting Standards Board (FASB) have since 2005 shared a long-term objective to improve and simplify the reporting for financial instruments. They

25 During the European G8 summit on October 4, 2008 in Paris, the French President Nicolas Sarkozy took up industry arguments about the competitive disadvantage suffered by banks subject to IFRS by announcing that the E.U. would be given powers to reclassify financial instruments from the trading book to the banking book including those already held or issued,' and subsequently the E.U. Commissioner Charlie McCreevy announced that the E.U. had prepared legislation to 'carve out' from IAS 39 that would allow reclassification of financial assets if the IASB did not alter the accounting standard on its own. The next day (October 9) the IASB suspended due process to allow reclassification of fair values.

26 Statements of Financial Accounting Standards (SFAS) 115 "Accounting for certain investments in debt and equity securities" and SFAS 65 "Accounting for certain mortgage banking activities." Under U.S. GAAP, SFAS 115 permits a security to be reclassified out of the trading category in rare situations while SFAS 65 permits a loan to be reclassified out of the 'held for sale' category if the entity has the intention and ability to hold the loan for the foreseeable future or until maturity. The IASB's board was asked to consider allowing entities applying IFRSs the same ability to reclassify a financial asset out of the held-for-trading category as is permitted by SFAS 115 and SFAS 65.

27 Paragraph 50E of IAS 39 as amended. The IASB board decided that "a financial asset that would have met the definition of loans and receivables (if it had not been designated as available for sale) should be permitted to be transferred from the available-for-sale category to loans and receivables, if the entity intends to hold the loan or receivable for the foreseeable future or until maturity" (IASB, Reclassification of financial assets: amendments to IAS 39 and IFRS 7, Paragraph BC104D)

28 Paragraphs 50B and 50D of IAS 39 as amended.

29 Taken from Bischof et al. (2010)

	Net income	Equity (OCI)
Pre-October 2008:		
1. AFS to HTM		X
Post-October 2008:		
2. HFT to AFS	X	
3. HFT to HTM	X	X
4. HFT to L&R	X	X
5. AFS to L&R		X

Sources: IASB, Bischof et al, (2010), authors' analysis

Table 3 – Types of reclassifications and their effects on income and equity – before and after October 2008

Phases	Status
1. Classification and measurement	IFRS 9 Financial instruments for financial assets was published in November 2009. An exposure draft on the "Fair value option for financial liabilities" was published in May 2010 with a comment deadline of 16 July 2010.
2. Impairment methodology	The exposure draft "Amortized cost and impairment" was published in November 2009 with a comment deadline of 30 June 2010.
3. Hedge accounting	The IASB expects to publish an exposure draft in time to allow for finalization by the second quarter of 2011.

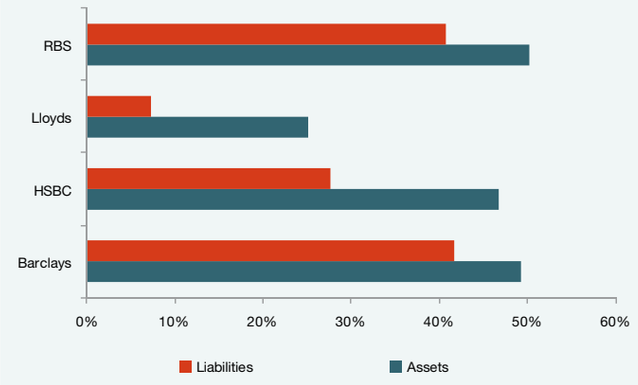
Source: IASB

Table 4 – IASB project plan for replacement of IAS 39

published a discussion paper, "Reducing complexity in reporting financial instruments," in March 2008. In November 2008, almost concurrently with the introduction of the relaxed reclassification rules, the IASB added the project to its active agenda.[30] This was followed in April 2009 by the announcement of an accelerated timetable for the replacement of IAS 39. The IASB aims to replace all the requirements of IAS 39 by the second quarter of 2011. However, as set out in Table 4, the board has divided the development of the new standard, IFRS 9 Financial instruments, into three main phases.[31] Companies reporting under IFRS shall apply IFRS 9 for financial years beginning on or after 1 January 2013, though earlier application is permitted.[32]

The various categories of financial assets in IAS 39, each with its own classification criteria, are replaced in IFRS 9 by a more principles-based approach. Chapters 4 and 5 of IFRS 9 require all financial assets to be: classified on the basis of the entity's business model for managing the financial assets and the contractual cash flow characteristics of the financial asset; initially measured at fair value plus, in the case of a financial asset not at fair value through profit or loss, particular transaction costs; and subsequently measured at amortized cost or fair value.

An important feature of IFRS 9 is that it sets specific criteria for assets to be measured at amortized cost. A financial asset shall be measured at amortized cost if both of the following conditions are met:[33] the asset is



Source: Bank reports and accounts, authors' calculations

Figure 2 – Fair valued assets and liabilities as a proportion of total financial assets and liabilities (end 2009)

held within a business model whose objective is to hold assets in order to collect contractual cash flows, and the contractual terms of the financial asset give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding.

Otherwise, a financial asset shall be measured at fair value. Further, reporting entities may, at initial recognition, continue to designate a financial asset as measured at fair value through profit or loss if doing so eliminates or significantly reduces a measurement or recognition inconsistency that would otherwise arise from measuring assets or liabilities or recognizing the gains and losses on them on different bases.[34] Reclassification of financial assets is tied to changes in business model. IFRS 9 specifies that a reporting entity can reclassify all affected financial assets when, and only when, it changes its business model.[35]

IFRS 9 also narrows the fair value gains and losses taken through other comprehensive income rather than the income statement. At initial recognition, a reporting entity may choose to present in other comprehensive income gains and losses on an equity instrument not held for trading.[36] Otherwise, unless part of a hedging relationship, gain or loss on a

30 In December 2008, the FASB also added the project to its agenda.

31 As the board completes each phase, it is deleting the relevant portions of IAS 39 and creating chapters in IFRS 9 with the new requirements. The first phase of the IAS 39 replacement project covers classification and measurement of financial assets. Following a July 2009 exposure draft, the board issued in November 2009 Chapters 4 and 5 of IFRS 9 covering classification and measurement respectively.

32 Subject to E.U. endorsement in the case of companies listed in E.U. countries.

33 IFRS 9, paragraph 4.2.

34 IFRS 9, paragraph 4.5.

35 IFRS 9, paragraph 4.9.

36 IFRS 9, paragraph 5.4.4. If an entity makes the election in paragraph 5.4.4, it shall recognize in profit or loss dividends from that investment when the entity's right to receive payment of the dividend is established in accordance with IAS 18 Revenue.

financial asset measured at fair value are recognized in profit or loss.

In summary, the accounting regime governing the classification of financial instruments and reporting of fair value gains and losses has undergone, and continues to undergo, major change. At the height of the financial crisis, the IASB relaxed the provisions of IAS 39 governing asset reclassification, with significant implications for the reported financial results of banks operating under IFRS. Yet following the crisis, the IASB is planning to replace the complexities of IAS 39 with a simpler regime designed to address many of its shortcomings.

Analysis of U.K. banks' financial statements

This section of the paper draws on the recent financial statements of the large U.K. banks to illustrate the accounting issues outlined in the two preceding sections[37]. It first sets the context by looking at the scale and composition of each bank's fair valued assets and liabilities. It then uses the banks' recent financial statements to illustrate:

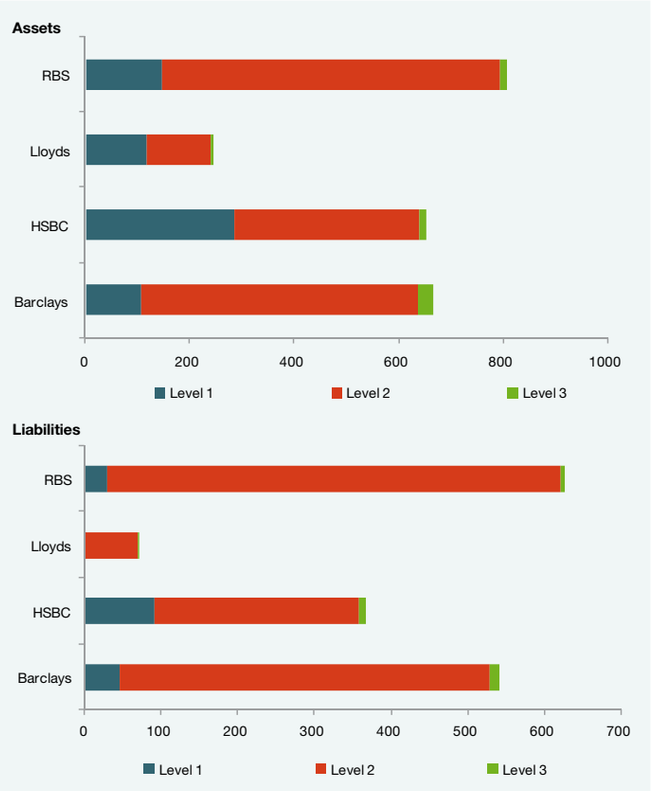
- The lack of articulation between balance sheet headings and the IAS 39 itemization of fair value assets and liabilities.
- The bifurcation of the recognition of fair value movements between profit or loss and other comprehensive income.
- The effects of the reclassifications allowed by the IASB's changes of October 2008.
- The difficulties in distinguishing the contribution to income of non-cash fair value movements (unrealized gains and losses) from genuine cash flows (realized gains/losses and interest, dividends, etc.) related to those instruments.

Scale and composition of fair valued assets and liabilities

Figure 2 shows the proportion of financial assets and liabilities accounted for by fair valued instruments at end 2009. Fair valued assets accounted for approximately half of total financial assets in the case of Barclays, HSBC, and RBS. At 25%, the proportion was significantly smaller for Lloyds. In the case of both Barclays and RBS, fair valued liabilities accounted for approximately 40% of total financial liabilities. The proportion was significantly smaller than for HSBC, which has a large customer deposit base. In the case of Lloyds, fair valued liabilities accounted for only 7% of total financial liabilities.

Figure 3 shows the breakdown of each of fair valued assets and liabilities by valuation technique at the end of 2009.[38] A much higher proportion of HSBC's and Lloyds' fair valued assets were Level 1 instruments (valued on the basis of market prices) than Barclays and RBS. For all the banks, a large majority of their fair valued liabilities were Level 2 instruments (valued on the basis of observable inputs).

Figure A1 in the Appendix shows the breakdown of each bank's fair valued assets and liabilities by IAS 39 category at the end of 2009. Looking at the breakdown of assets, the relatively high proportion of HSBC's instruments in the form of available-for-sale securities and the relatively high proportion of Lloyds' instruments designated as at fair value through profit or loss are noteworthy.[39] However, it is noteworthy more generally how large a proportion of the banks' fair valued assets fall into the residual "available-for-sale" category. For all the banks, a large majority of their fair valued liabilities were instruments held-for-trading (including derivatives).



Notes:
1 Level 1 – quoted market prices.
2 Level 2 – observable inputs.
3 Level 3 – significant unobservable inputs.
4 Though U.K.-domiciled, HSBC reports in U.S. dollars. HSBC figures converted from U.S. dollars to sterling at end 2009 £/U.S.$ rate of 0.616 (Source: HSBC).

Source: Bank reports and accounts, authors' calculations

Figure 3 – Breakdown of fair valued assets and liabilities by valuation technique (£ billion, end 2009)

37 All the banks have financial years ending on December 31.
38 As required under IFRS 7, Paragraph 27A.
39 This is mainly due to Lloyds' large life assurance business.

Comparing balance sheet headings with IAS 39 itemization of assets and liabilities

The analysis in the previous subsection shows that the degree of articulation between balance sheet headings and IAS 39 categorization of financial instruments varies between banks. The degree of articulation largely depends on the complexity of the bank's activities. In some cases, the mapping is comparatively straightforward. However, for banks with complex balance sheets, each IAS 39 category may map on to several balance sheet headings, and vice versa.

RBS is used as an example of a bank with a complex balance sheet. In Table 5, RBS's fair valued assets as defined under IAS 39 at the end of 2009 are mapped on to the relevant items in the consolidated balance sheet. The lack of articulation is most evident with assets designated as "held for trading" under IAS 39. These are spread across five different balance sheet headings in the consolidated balance sheet. The category "designated as at fair value through profit or loss" under IAS 39 maps on to three different balance sheet headings. Similar complexities are evident mapping from balance sheet headings to IAS 39 categories. For example, the balance sheet heading "debt securities" maps on to three different fair valued IAS 39 categories.[40]

This lack of articulation can leave users of accounts ignorant of the extent to which key balance sheet items are valued on a fair valued or amortized cost basis without digging deep into the notes to the accounts. Further, there may be counter-intuitive relationships between balance sheet headings and IAS 39 categories. In the case of RBS for example, not all the balance sheet item "loans and advances to customers" is captured under the IAS 39 amortized cost category "loans and receivables." As evident from the table, some loans and advances to customers fall under the IAS 39 fair valued category "held for trading".

Fair value recognition in profit or loss versus other comprehensive income

As detailed above, gains and losses arising from changes in the fair value of investments classified as "available-for-sale" are taken to equity through the statement of comprehensive income. In a cash flow hedge, the effective portion of the gain or loss on the hedging derivative is also recognized directly in equity. As the following analysis shows, the consequence is that a significant proportion of fair value gains and losses are not recognized in profit or loss.

Figure A2 in the Appendix shows the breakdown of total comprehensive income between profit for the year (the bottom-line of the income statement) and other comprehensive income. The figure underlines the contribution of other comprehensive income to banks' total comprehensive income. In 2008, the value of other comprehensive income was greater than profit for the year for two of the five banks. In 2009, the value of other comprehensive income was greater than profit for the year for two of the four banks (Lloyds acquired HBOS in January 2009). Further, other than perhaps for Barclays in 2009, even when profit for the year was greater, other comprehensive income was a significant contributor to the bank's total comprehensive income.[41]

In addition to movements in the value of available-for-sale securities and cash flow hedges, exchange rate movements and actuarial movements on defined benefit plans can also be significant components of other comprehensive income. To help highlight the extent to which these large movements in other comprehensive income are due to fair value gains and losses, Figure A3 in the Appendix shows the breakdown of other comprehensive income for the four largest U.K. banking groups in 2009.

Exchange rate movements were significant for Barclays, HSBC, and RBS in 2009, all of which have large international operations. Actuarial movements on defined benefit plans were significant for HSBC and RBS. However, even allowing for the contribution of these other components, the charts underline the importance of fair value movements, particularly movements in the value of available-for-sale financial assets. Available-for-sale investments were the largest contributor to the other comprehensive income of Barclays, HSBC, and Lloyds in 2009, and also a significant contributor to the other comprehensive income of RBS.

Impact of reclassifications

The asset reclassifications permitted by the IASB since October 2008 gave banks greater leeway to exclude fair value movements from the income statement. Indeed, in the document setting out the amendments to standards IAS 39 and IFRS 7, the IASB commented: "The Board noted that allowing reclassification, even in limited circumstances, could allow an entity to manage its reported profit or loss by avoiding future fair value gains or losses on the reclassified assets."[42]

An analysis of compliance with the reclassification options reveals that several of the large U.K. banks exploited the additional scope for reclassifications as permitted by the IASB to effectively improve their reported income. These 'improvements' were entirely due reclassification decisions and were thus 'cosmetic' in nature, since they did not ultimately affect the cash flow impact of the financial crisis or firms' responses. Table 6 summarizes the types of reclassifications used by the five largest U.K. banking groups in their 2008 accounts following the IASB's October 2008

40 In addition, RBS reported that at end 2009 £9.9 billion of instruments captured under the balance sheet heading "debt securities" mapped on to the IAS 39 amortized cost category "loans and receivables."

41 UBS (2009) estimates that of the overall €107 billion of estimated losses by European banks in 2008, only about 20% went through the income statement with the remainder recognized in other comprehensive income.

42 Amendments to the Basis for Conclusions on IAS 39 Financial instruments: recognition and measurement, paragraph BC104B.

	IAS 39 categories			
Balance sheet headings	Held for trading	Designated as at fair value through profit or loss	Hedging derivatives	Available-for-sale securities
Loans and advances to banks	45.4			
Loans and advances to customers	42.3	2.0		
Debt securities	111.5	2.6		143.3
Equity shares	14.4	2.2		2.9
Derivatives	436.9		4.6	
Total fair valued assets	**650.5**	**6.8**	**4.6**	**146.2**

Notes:
1 There may be similar complexities in matching IAS 39 amortised cost assets and liabilities on to balance sheet headings, notably "Loans and receivables" and "Financial assets and liabilities at amortised cost".

Sources: RBS 2009 Report & Accounts, authors' selection

Table 5 – Balance sheet headings and IAS 39 categories – RBS (end 2009, £ billion)

	Barclays	HBOS	HSBC	Lloyds	RBS
2008:					
HFT to AFS		X	X		X
HFT to HTM					
HFT to L&R	X		X	X	X
AFS to L&R		X		X	X
2009:					
HFT to AFS		na			
HFT to HTM		na			
HFT to L&R	X	na			X
AFS to L&R		na			

Notes:
1 HSBC did not reclassify any assets during 2009.
2 Lloyds, which acquired HBOS in January 2009, did not reclassify any assets during 2009.

Source: Banks' annual reports and accounts, authors' analysis

Table 6 – Types of reclassifications by U.K. banks in 2008 and 2009 accounts

			Type of asset – fair value (in £ billions)			
Bank name	Disclosure (auditor)	Reference year	HFT to AFS	HFT to LAR	AFS to LAR	Effect on profit or loss (in £ billions)
Barclays[43]	Limited (PwC)	2008	-	4.0	-	(2)
	Limited (PwC)	2009		8.0		(2)
HBOS[44]	Limited (KPMG)	2008	12.2		35.4	+1.0
HSBC (U.S.$ billion)[45]	Extensive (KPMG)	2008	2.5	15.3	-	+3.5
	Extensive (KPMG)	2009	-	-	-	-
Lloyds[46]	Extensive (PwC)	2008	-	3.0	0.4	+0.4
	Extensive (PwC)	2009	-	-	-	
RBS[47]	Extensive (Deloitte)	2008	15.0	18.2	0.7	+5.9
	Extensive (Deloitte)	2009	-	2.0	-	(4)

Notes
1 Fair values/carrying values at the time of reclassification.
2 Impact on profit or loss is for the year of reclassification.
3 Barclays: negligible impact on income statement.
4 RBS: 2009 reclassifications – negligible impact on income statement for the year.
5 RBS: 2008 reclassifications based on restated figures in 2009 annual report.

Sources: Banks' annual reports, authors' analysis.

Table 7 – Materiality of asset reclassifications and financial impact on profit or loss

changes. All the banks took advantage of the rule-relaxation to reclassify assets from HFT to either L&R, AFS, or both. Three of the banks (HBOS, Lloyds, and RBS) also shifted assets from the AFS category to L&R.

Table 7 shows both the value (fair value) and effect on profit or loss of the implementation of relaxation rules by U.K. banks. Disclosure varies considerably between banks. The analysis reported in Table 7 shows that RBS exploited three types of new asset reclassifications that were available after October 2008 climb down by the IASB for IAS 39 reclassifications. HBOS, HSBC, and Lloyds each used two of the reclassification options. In several cases, the impact on profit or loss for 2008 was significant. In 2008, the increase in RBS's profit or loss as a result of reclassification was almost £5.9 billion. If the debt securities reclassified by HBOS from

43 Barclays Annual accounts 2009; 2008, footnote 51.
44 HBOS Annual accounts 2008, footnotes, 11, 45 (p. 80); note : HBOS was taken over by Lloyds in 2009
45 HSBC Annual accounts 2008, pp 145-146. HSBC reports in U.S. dollars.
46 Lloyds TSB plc, Report and Accounts 2009, footnote 55, p. 222.
47 RBS Annual accounts 2008, footnote 11, pp. 208-209; Annual accounts 2009, footnote 11, pp. 275-277.

HFT to AFS during 2008 had not been reclassified, additional negative fair value adjustments of almost £1.0 billion would have been recognized in the income statement. HSBC states that if the 2008 reclassifications had not been made, the Group's pre-tax profit would have been reduced by U.S.$3.5 billion from U.S.$9.3 billion to U.S.$5.8 billion.

Overview of fair value gains and losses

Underlying these specific points is the fact that fair value accounting leaves banks' reported income vulnerable to unrealized movements in fair value that may bear no relation to actual cash flows. Further, with Level 2 instruments accounting for a majority of banks' fair valued assets and liabilities (see Figure 3), these unrealized movements in fair value may not even reflect movements in quoted market prices.

It is, therefore, important that investors are able to understand the composition of the contribution of fair valued financial instruments to reported income. In particular, there needs to be full disclosure on the breakdown between non-cash fair value movements and genuine cash flows (realized gains/losses and interest, dividends, etc.) related to those instruments.

However, the U.K. banks' financial statements illustrate the difficulties in achieving such a breakdown.

Looking first at the income statement, fair value changes are mainly captured by banks under the item "net trading income." This comprises both gains and losses from changes in the fair value of financial assets and financial liabilities held for trading, and the related interest income, expense, and dividends generated by the instruments. For example, looking at the 2009 financial statements of the banks:

- Barclays: "net trading income includes the profits and losses arising both on the purchase and sale of trading instruments and from the revaluation to fair value, together with the interest income earned from these instruments and the related funding cost."[48]
- HSBC: "net trading income comprises all gains and losses from changes in the fair value of financial assets and financial liabilities held for trading, together with the related interest income, expense and dividends."[49]
- Lloyds: "trading securities are debt securities and equity shares acquired principally for the purpose of selling in the short term or which are part of a portfolio which is managed for short-term gains. Such securities are classified as trading securities and recognized in the balance sheet at their fair value. Gains and losses arising from changes in their fair value together with interest coupons and dividend income are recognised in the income statement within net trading income in the period in which they occur."[50]
- RBS: "trading income comprises gains and losses on financial instruments held for trading, both realized and unrealized, interest income and dividends and the related funding costs."[51]

Even in the notes to the accounts, the cash flow generated by the various fair valued financial instruments is not cleanly separated from the non-cash impact of unrealized changes in value. In its consolidated income statement, HSBC does break down net trading income between "net interest income on trading activities" and "trading income excluding net interest income." However, it is not clear if the latter is limited to unrealized fair value movements on financial instruments held for trading. It may also include realized gains and dividends on trading assets.[52]

Some banks itemize separately within the income statement "net income from financial instruments designated at fair value." However, this item suffers from the same problem of disentangling movements in fair value from the related interest income, expense, and dividends generated by the instruments.

For example, HSBC states: "net income from financial instruments designated at fair value includes all gains and losses from changes in the fair value of financial assets and financial liabilities designated at fair value through profit or loss. Interest income and expense and dividend income arising on these financial instruments are also included in 'Net income from financial instruments designated at fair value', except for interest arising from debt securities issued, and derivatives managed in conjunction with those debt securities, which is recognized in 'Interest expense'."[53]

In summary, this section of the paper has highlighted the difficulties in tracking the impact of fair value movements on a bank's reported income. Users of banks' financial statements have to navigate the complexities of the classification framework governing financial instruments, the bifurcation of gains and losses between profit or loss and other comprehensive income, the impact of reclassifications following the IASB's October 2008 changes to IAS 39, and the fundamental difficulties in disentangling unrealized movements in fair value from real cash flows generated by fair valued instruments.

48 Barclays Bank PLC Annual Report 2009, Note 4: Principal transactions, p41.

49 HSBC Holdings plc Annual Report and Accounts 2009, Note 2: summary of significant accounting policies, (b) non-interest income, p369.

50 Lloyds Banking Group, Annual Report and Accounts 2009, note 2: accounting policies, (E) financial assets and liabilities, p135.

51 RBS Group, Annual Report and Accounts 2009, Note 2: non-interest income (excluding insurance premium income), p260.

52 There is some clarity in the case of available-for-sale financial assets, at least to the extent that only unrealized fair value gains and losses are recognized in other comprehensive income. On sale, impairment, or maturity of the asset, the cumulative gain or loss previously recognized in other comprehensive income is recognized in the income statement. Impairment losses, exchange differences from retranslating the amortized cost of foreign currency available-for-sale financial assets, and interest calculated using the effective interest method are recognized in profit or loss.

53 For HSBC Holdings plc Annual Report and Accounts 2009, note 2: summary of significant accounting policies, (b) non-interest income, p369.

Concluding remarks on IFRS 9

The prior literature on bank reporting has paid much attention to "big picture" fair value issues following the financial crisis ("procyclicality," "mark-to-model," etc). But insufficient attention has been paid to the detail of how banks currently report fair value assets and liabilities, and the transparency problems arising from that. We seek to address a major unresolved issue in the debate on fair value, namely, the mapping of the impact of fair value movements on to banks' reported earnings and balance sheets.

Our analysis shows a fundamental lack of transparency in the impact of fair value accounting on banks' financial statements. In particular we find that:

- There is a lack of articulation between balance sheet headings and the IAS 39 itemization of assets and liabilities.
- The bifurcation of the recognition of fair value movements between profit or loss and other comprehensive income obscures their overall impact on reported income.
- Bank reclassifications of fair valued financial instruments following the IASB's October 2008 changes added to the lack of transparency.
- Overall, it is difficult to distinguish the contribution to income of non-cash fair value movements from genuine cash flows (realized gains/losses and interest, dividends, etc.) related to those instruments.

To what extent is the replacement of IAS 39 by IFRS 9 likely to address this lack of transparency?

Under IFRS 9, the available-for-sale financial asset and held-to-maturity categories in IAS 39 will be eliminated. All financial assets except for certain equity investments will be classified as either amortized cost or fair value through profit or loss. This simplification of the classification framework for financial instruments ought to improve the transparency of banks' financial statements, including the level of articulation with balance sheet headings.

However, the counter-intuitive relationships between some balance sheet headings and IAS 39 categories, highlighted above with the example of RBS, may persist in part under IFRS 9. In particular, given IFRS 9's tight restrictions on the use of amortized cost valuation (see below), the balance sheet item "loans and advances to customers" may continue to include fair valued loans and receivables if the assets are held for sale or trading.

While movements in fair value will continue to be split between profit or loss and other comprehensive income, the scale of movements recognized in other comprehensive income is likely to be lower than under IAS 39. The extent of the reduction will largely depend on the overlap between equity instruments not held for trading (which can be taken to other comprehensive income under IFRS 9) and available-for-sale instruments under IAS 39. Qualifying equity investments under IFRS 9 are likely to form a smaller category than available-for-sale assets under IAS 39 given that the latter can include both equity shares and debt securities.[54]

However, if a reporting entity exercises the option under IFRS 9, all subsequent changes in fair value are recognized in other comprehensive income with no recycling of gains or losses to the income statement. Investors may, therefore, still have to piece together information from profit or loss and other comprehensive income to understand the overall impact of fair value movements on reported income.

Under IFRS 9, reclassifications are likely to have less impact on reported income. Reclassifications between amortized cost and fair value will be permitted only if there is a change in the reporting entity's business model. Further, given that fair value movements on a narrower range of instruments will be recognized in other comprehensive income (and with dividends on qualifying equity instruments recognized in the income statement), fewer reclassifications are likely to transfer the recognition of fair value movements from profit or loss to other comprehensive income.

Under IFRS 9, as detailed above, a financial asset is measured at amortized cost if:

- The objective of the business model is to hold the financial asset for the collection of the contractual cash flows, and
- The contractual cash flows of the instrument are solely payments of principal and interest on the principal outstanding.

All other financial assets are measured at fair value. Consequently, reclassifications between amortized cost and fair value are only likely to apply to loans and receivables and debt securities (i.e., instruments on which the cash flows are payments of principal and interest), and only apply in cases where the reporting entity changes its business model for managing the assets (i.e., between holding and trading the relevant assets).

Given the large proportion of available-for-sale bank financial assets that are debt instruments, at least some of these are likely to qualify for measurement at amortized cost under IFRS 9 [UBS (2009)]. Nonetheless, by setting tight criteria for the use of amortized cost, IFRS 9 appears to entrench, if not extend the use of fair value reporting. The new standard effectively establishes fair value as the default measurement category. It is surely ironic that the exception to fair value in IFRS 9 (a business model based on contractual cash flows of principal and interest) is the core business model of traditional retail banking. The "trading book" rather than the "banking book" measurement basis is the default.

54 UBS (2009) estimates that about 93% of aggregate available-for-sale assets in its sample of European banks are debt securities, with the remaining classified as equity.

Underlying these concerns is the fundamental lack of transparency on the contribution of non-cash movements in fair value to banks' reported income. This paper has emphasized the difficulties faced by users of financial statements in distinguishing the contribution to reported income of non-cash fair value movements from genuine cash flows related to those instruments.

Indeed, though IFRS 9 may bring greater transparency by reducing the proportion of fair value movements taken to equity through other comprehensive income, the recognition of these movements in profit or loss may increase the impact of non-cash gains and losses on reported earnings.[55] If anything, this strengthens the case for greater transparency on the contribution of non-cash fair value movements to reported earnings. However, nothing in IFRS 9 appears to specifically address this problem.

IFRS 9, therefore, appears to be a welcome step in the right direction. But its provisions reinforce the place of fair value measurement in banks' financial reporting. And it may still leaves users of financial statements struggling to understand the scale and composition of fair value movements, and their impact on reported income.

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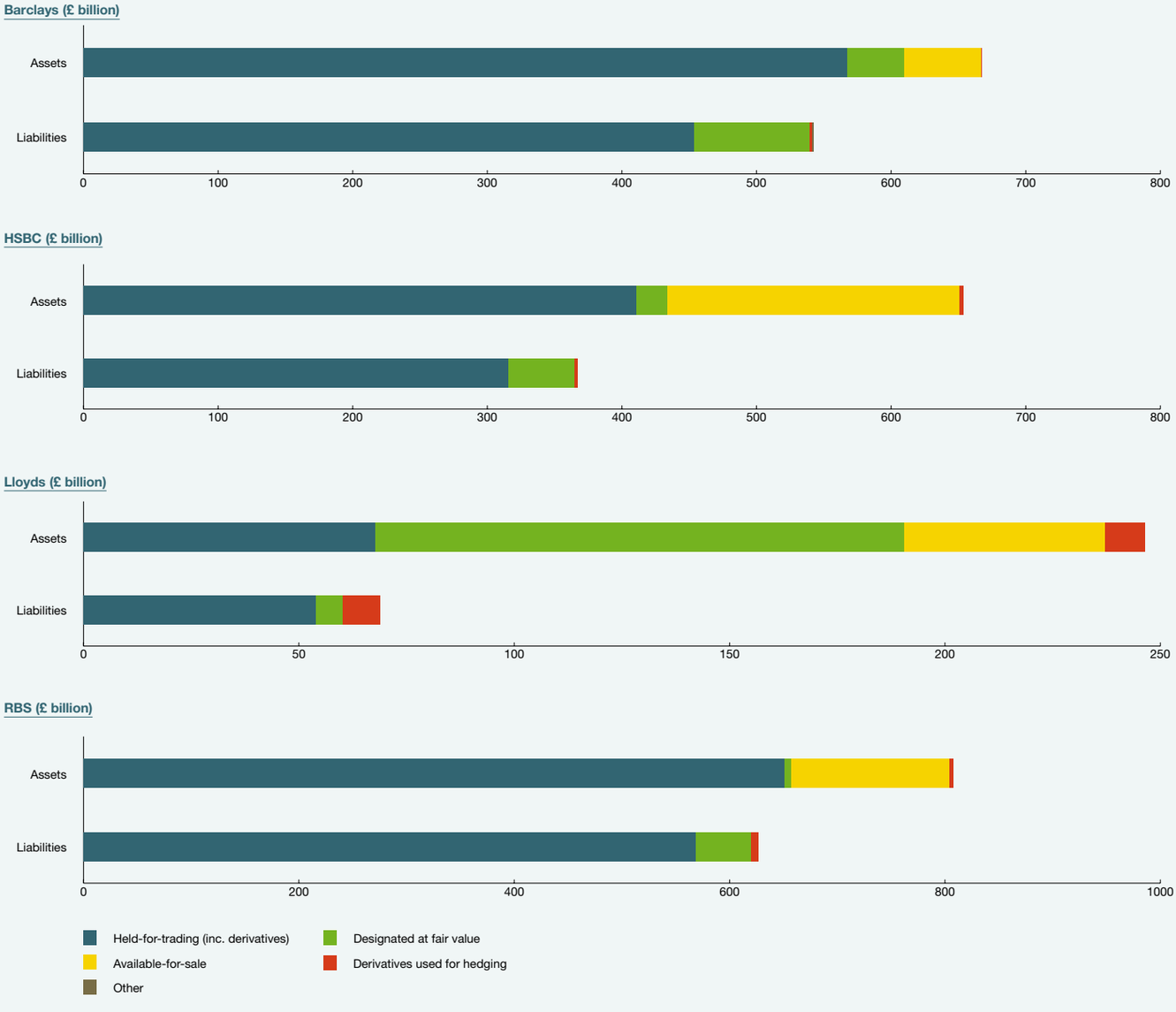
55 The vulnerability of earnings to the impact of non-cash movements may be further increased if the IASB moves from an incurred loss to an expected loss model for the reporting of loan loss provisions.

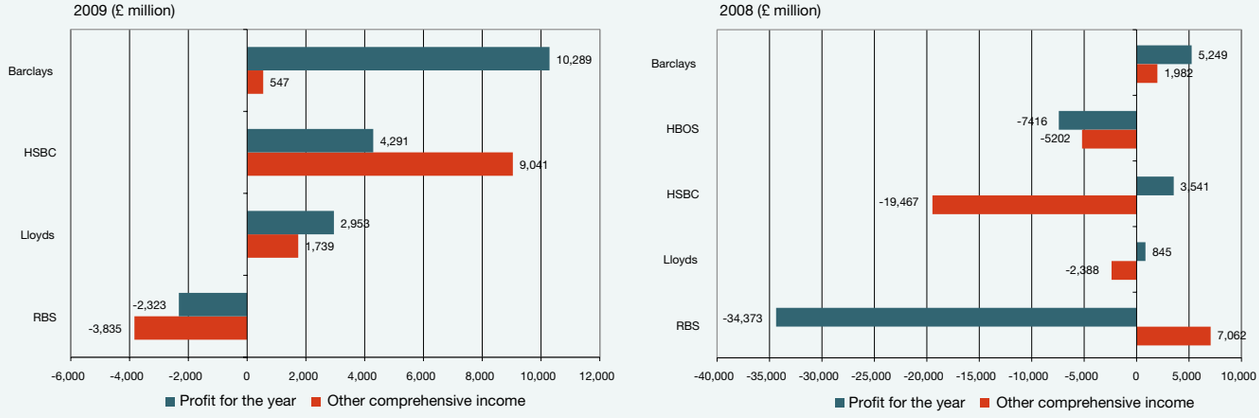
Appendix



Notes:
Though UK-domiciled, HSBC reports in U.S. dollars. HSBC figures converted from U.S. dollars to sterling at end 2009 £/U.S.$ rate of 0.616 (Source: HSBC).

Source: Bank reports and accounts, authors' presentation

Figure A1 – Breakdown of fair valued assets and liabilities (end 2009)



Notes:

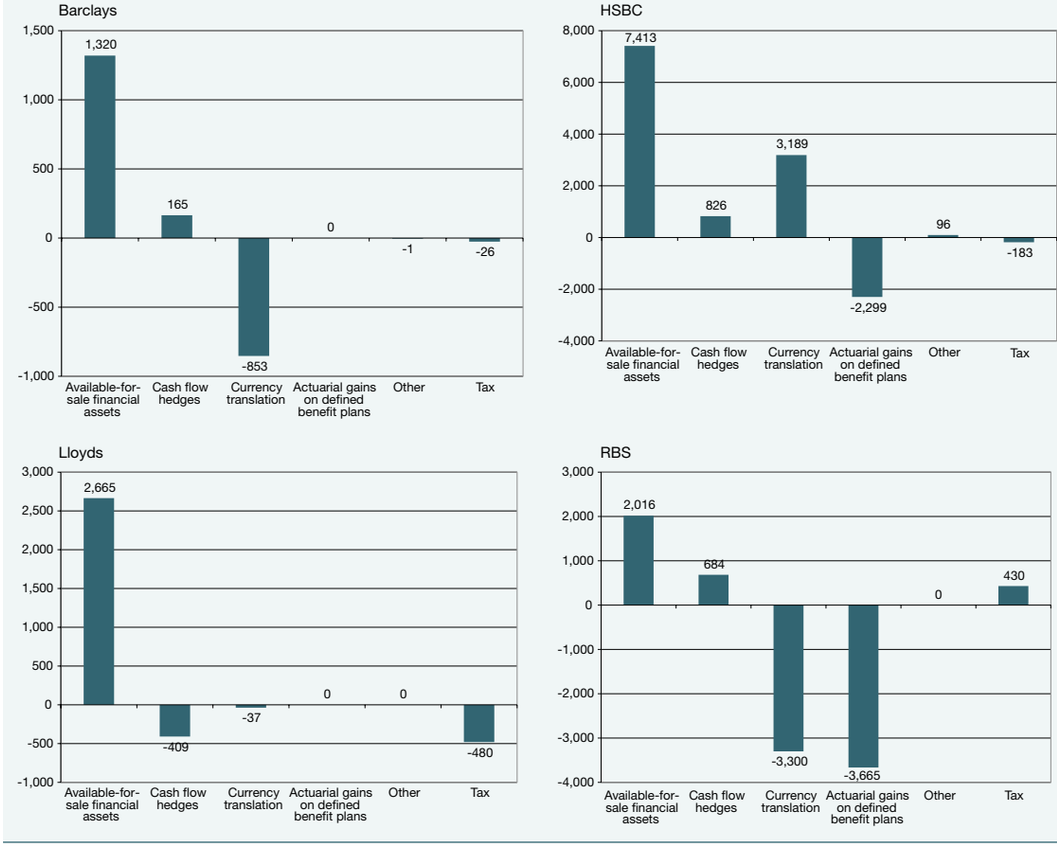
1 Though U.K.-domiciled, HSBC reports in U.S. dollars. HSBC figures converted from U.S. dollars to sterling at average 2009 and 2008 £/U.S.$ rates of 0.641 and 0.545 respectively (Source: HSBC).

2 Lloyds TSB completed its acquisition of HBOS on January 16 2009, and the name of the combined group was changed to Lloyds Banking Group plc (LBG).

3 2008 figures taken from 2008 annual reports, so will not include any restatements in 2009 annual reports.

Source: Bank reports and accounts

Figure A2 – Breakdown of total comprehensive income between (a) profit for year and (b) other comprehensive income



Notes:

1 Components of other comprehensive income are shown pre-tax, with the tax for all items shown as a separate item. The banks disclose the income tax charge for each component of other comprehensive income, either in the Statement of Total Comprehensive Income or in the notes to the accounts.

2 Barclays' figures cover other comprehensive income for the year from continuing operations. It also reported other comprehensive income for the year from discontinued operations of -£58m.

3 HSBC figures converted from U.S. dollars (in which the bank reports) to sterling at average rate of 0.641 (Source: HSBC).

Source: Bank reports and accounts

Figure A3 – Breakdown of other comprehensive income – 2009 (£ million)

PART 2

Constraints to Improving Financial Sector Regulation[1]

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Abstract

Following every major financial debacle (of which we now have had three in the span of a decade – the Asian crisis, the dot-com bubble, and the subprime crisis), all the parties that bear some responsibility for the soundness of financial institutions come under scrutiny – the managers (and their pay/incentive packages), the directors, the auditors, the rating agencies, the market analysts, the risk models, the whiz kid mathematics geniuses who build them, and of course the supervisory officials and the regulations they administer. Given the many past crises and the concerted efforts over the years to devise better regulatory frameworks, this paper argues that we are at a point of diminishing returns on additional expenditure of efforts on devising better standards and rules. The difficulties lie in administering the existing rules effectively. It observes that financial crises emerge out of the interaction between borrowers and lenders and between the demand for and the supply of instruments tailoring risk in a dynamic context of imperfect information, incomplete markets, herd behavior, and unpredictable shocks and responses. This generates a number of effects that make it difficult to refine the regulatory framework to prevent crises, however much practice we have had with such events.

1 The observations here draw on two sets of experiences: First, from 1983-1990 in the Department of Finance, the author served as Senior Economist and later Chief of the Financial Institutions Policy section, subsequently Project Director for the Financial Institutions Reform Project, and Chair of the Inter-departmental Legislative Review Task Force; in this capacity he was the principal drafter of the sequence of policy papers issued by the Department during this period leading up to the major reforms of Canadian financial regulation in 1992. Second, from 1995 through 1998, the author had editorial responsibility for the APEC Economic Outlooks and thus followed the progress of the Asian economic and financial crisis and the responses to it in great detail.

Financial institutions' stock in trade is understanding and managing risk by maintaining adequate liquidity and capital to ensure their viability both on a "going concern" basis (i.e., able to meet their obligations as they come due) and on a solvency basis (i.e., value of assets exceeds value of liabilities), given the structure of their assets and liabilities. In managing their affairs, financial institutions have multiple lines of defense against failure: internal risk-monitoring management systems, often based on mathematically sophisticated techniques to mine the massive databanks that have been developed on financial markets and instruments; internal auditors; board of directors' audit committees; the boards of directors themselves; external auditors; the disciplines generated by scrutiny from interested shareholders, market analysts, and credit rating agencies, and of course the supervisory and regulatory frameworks.

By the same token, following every major financial debacle (of which we now have had three in the span of a decade – the Asian crisis, the dot-com bubble, and the subprime crisis), recriminations are leveled at all of the above – the managers (and their pay/incentive packages), the directors, the auditors, the rating agencies, the market analysts, the risk models and the whiz kid mathematics geniuses who build them, and of course the actual rules and regulations themselves. So once again, regulatory frameworks are under scrutiny.

Most countries have rules that are broadly consistent with global standards that have emerged through decades of concerted international research through organizations such as the Bank for International Settlements and the International Organization of Securities Commissions (IOSCO), coupled with ongoing pressures for regulatory convergence due to international competitiveness concerns. Arguably, the main difficulties lie in implementation and/or in administering known principles effectively. In this regard, one of the conclusions emerging from the review of the supervisory implications of the emerging market crises of the late 1990s by the Bank for International Settlements (BIS) was that, insofar as it has been possible to address risks, it has been in terms of addressing credit, liquidity, and market risks seriatim; their interaction, however, remains beyond adequate regulatory treatment. More generally, financial crises emerge out of the interaction between borrowers and lenders and between the demand for and the supply of instruments tailoring risk in a dynamic context of imperfect information, incomplete markets, herd behavior, and unpredictable shocks and responses.

This paper identifies a number of features of the global financial system that make it difficult to refine the regulatory framework to prevent crises, however much practice we have had with such events.

Where are the constraints?

Each financial system has rich institutional flavor: one size does not fit all

While there is a good deal of consensus on how one should regulate and supervise financial institutions in the abstract, the devil is in the application of these principles in the specific instances. Each financial system evolves in conjunction with the economy in which it is embedded and adjusts to the idiosyncratic risk elements of that economy, the legal setting which always and everywhere has unique elements, the specific historical facts of an economy, and the public policy choices that have been made. For example, the Canadian financial system went through the recent global financial crisis largely unscathed even though Canada was subject to many of the same basic influences that inflated the real estate bubble in the U.S. While this has prompted examination of Canada's financial sector structure, regulation, and supervisory culture to explain the relatively good outcomes, there were also important differences on the demand side for the different outcomes. For example, in Canada, mortgage lenders generally have recourse to non-mortgage assets of the mortgagee in the event of default, whereas in many U.S. states this is not the case. Moreover, in Canada, mortgage interest is not tax deductible as it is in the U.S. Accordingly, the two systems differ in terms of the incentives for real estate speculation. At the same time, the relatively more even income distribution in Canada than in the U.S. resulted in Canadian households being much less dependent on withdrawal of housing equity to support consumption, reducing the pressure on them to seek risky ways to maintain lifestyles. And, there was no comparable international appetite for Canadian-dollar denominated assets as there was for U.S.-dollar denominated assets, a factor which inflated the U.S. bubble to a disproportionately large size.

While different financial sectors operate in very different contexts, pressure from international trade drives systems towards international norms (i.e., the BIS's standard capital requirements for banks operating internationally). This can create risk.

Human limitations

Human limitations make themselves felt in various ways. First, information decay is very real within any institution as it goes up the chain of command and to the external auditors and supervisors. It is important to minimize this decay, but it is not possible to eliminate it, in part because complex financial information is not fully "compressible" into summary form. Human limitations on ability to cope with complex, high volume data thus place inherent limits on the ability to control.

Second, it is one thing to have generally agreed principles, it is another to recognize how these principles should be applied in specific, complex situations – the "prudent investor" rule does not come with instructions. Since recent experience is always more heavily weighted in judgments,

any period of good growth and stability will tend to bring considerations of the role of the financial system in financing growth to the fore while relegating prudential concerns to the back burner. Accordingly, it is precisely at the points in time when an economy is becoming most risky (towards the end of an expansionary cycle) that sensitivity to risk is least within the system and focus on pro-competitive growth greatest. Because of normal turnover over the course of a decade, the more or less typical span of a cycle, it will be often the case that the operational staff will know a crisis only in theory, not when it is staring them in the face for the first time.

Third, even developed countries face resource constraints in terms of both personnel for supervisory systems and for qualified staff within financial institutions themselves. In the lead-up to the savings and loan crisis in the U.S., for example, it was noted that budgetary cutbacks had left the supervisory system with supervisory staff that was inadequate in terms of numbers and also low-paid. In Canada, in implementing requirements to increase the qualifications of internal auditors pursuant to the 1992 financial institutions reforms, lengthy phase-in periods had to be granted to smaller financial institutions. For developing countries, the situation is even tougher because the same personnel required for supervision have the skills to earn more in the financial institutions that need supervision.

In summary, it can be generally stated, accordingly, that the capacity to supervise will probably tend to trail the evolution of the financial system.

Improved disclosure and greater transparency does not necessarily eliminate surprises or reduce volatility

Improved disclosure on the part of borrowers and lenders is in part predicated on the proposition that it will reduce surprising and abrupt market moves. Can it be said that surprises in transparent economies are lesser than in less transparent economies? No definitive answer is possible but one can observe that, in the financial reporting regime that has the highest standards of disclosure, the U.S., surprises are also frequent, major, and lead to sharp swings in markets. Quite clearly, enhancing transparency does not necessarily eliminate sharp swings. Several reasons can be put forward to explain this.

- **First, the market adjusts to increased information –** where information is poor and cannot be modeled, the market must await the data. Where information is good and can be modeled, the market moves on forecasts. Expectations are, therefore, capitalized to a greater extent where there is better information. Because of the capitalization of expectations, wealth effects from surprises were simply enormous in the U.S. following the technology bust. Generally speaking, the market operates at the edge of ignorance, which is the flip side of the coin that the market incorporates all known information.
- **Second, the market discounts bad information as readily as it capitalizes good information –** as is well known, where data are poor, investors tread more cautiously and build in more conservative valuation assumptions than the official record would suggest. There is, therefore, as much potential for surprise (relative to expectations) in a transparent economy as in a non-transparent economy (relative to actual data, which are treated with great circumspection).
- **Third, capitalizing expectations leads to comparatively sharp changes in the present value –** the more confident markets are in capitalizing expectations over longer periods the sharper are the implied swings in present values when expectations change. Moreover, insofar as short-term information is inherently "noisier" than longer-term information, increasing the frequency of information flow risks having more "noise" being capitalized, which obviously is not necessarily helpful.
- **Fourth, the "flight to quality" must be understood as an admission of ignorance –** the theory behind enhancing transparency is that the market discriminates very efficiently across risks, and the more perfect the information, the better the market discrimination. However, the very existence of the terms "flight to quality" and "safe haven" is an admission that the market does not discriminate perfectly and, moreover, that market participants are not in a position or willing to assess the "true" value of investments but rather are prepared to bail out into a commonly recognized safe haven. If everyone believes the Swiss Franc or U.S. dollar will be safe harbors, then their own actions will in fact make these economies safe havens. Once this pattern is established, it is learned and acted on. Accordingly, not acting on rumor leads to lost profit opportunity since there is a reliably predictable surge in safe haven currencies about to happen.
- **Fifth, information is feedback –** financial feedback loops are feedback. Sometimes this is negative feedback, as in when a price slump is viewed as a "buying opportunity." Sometimes it is positive feedback such as when good news leads to buying, improving values, inciting more buying; and vice versa. Positive feedback in any context intensifies the event. In the financial world, increased information is thus intensified feedback, implying more intense cyclicality if positive feedback loops exist. Further, insofar as short-term financial information is noisier than lower frequency data, more frequent information always runs the risk of triggering feedback loops that run out of control.
- **Sixth, reliance on capital markets and increasing transparency expands the importance of publicly disclosed information relative to private information –** investors rely primarily on publicly available information in making their country risk assessments, and use generally similar models to reflect risk, based on the state of the art. Moreover, the credit rating agencies use publicly available (and for the most par very basic) information in developing sovereign risk ratings. Their ratings are highly correlated with risk spreads in the market and also independently affect them (i.e., the effect of a ratings cut is to reduce liquidity available, which itself is a negative factor in lending decisions). These high correlations mean that the feedback loops are tight and

highly efficient. Banks were surprised during the Asian crisis with the rapidity with which liquidity dried up in Asia. This tight feedback loop would seem to help explain why. Conversely, when lending is disproportionately through intermediated forms, a greater portion of the information on an economy is in the private possession of the lender. Assessments are less correlated because the information base of any two lenders is different. More diversified opinions probably allow more short-term volatility without leading to extreme movements.

- **Finally, there is the conceit of control over events that information flow engenders –** as information flow expands, it invites sophisticated modeling. For example, in the BIS guidelines for derivatives exposure, it is noted that "One outstanding feature of financial markets is the increasing use of sophisticated models by major institutions as their principal means of measuring and managing risk. As a consequence, supervisory agencies will need to assure that they (and external auditors) have staff with sufficient mathematical knowledge to understand the issues and that the reliability of models can be independently verified by external auditors." Then consider Long-Term Capital and its Nobel Prize winners!

Generally speaking, changing the rules of the game from one crisis episode to another tends to invalidate the experience of the previous episode as a guide to the future

Analysis of one crisis leads to changes in the models that predict crisis. We have gone from first generation to second generation models and probably will move on to third and fourth generation models. It is only natural for these new models and the associated analysis to affect both supervisory practice and the risk-taking behavior of financial institutions. The modified behavior of both sets of actors changes the context and necessarily invalidates to some extent the basis for the models of risk. Notably, in the run-up to the Asian crisis, one of the commonly heard arguments as to why Asian current account deficits were sustainable was that, unlike in the case of the Latin American debt crisis, the borrowers were private corporations. Hence, the money was being put to profitable use rather than being squandered by governments. Interestingly, the Asian crisis had the character of a private sector crisis where the Latin American crisis had been one of sovereign borrowers.

Insofar as non-neutrality towards sources of risk is built into rules, this intensifies the shift in the locus of risk – and in a way that will by definition come as a surprise. For example, the risk weighting framework within the Basel Accord divided sovereign risks into two zones: in Zone A were countries that were either within the OECD or had a General Agreement to Borrow arrangement with the IMF; all others fell into Zone B. The risk weighting of bank loans varied by zone, with sharp discrete changes from category to category. Of particular importance, loans to banks in Zone A received a 20 percent risk rating (requiring 1.6 percent capital backing) regardless of maturity, while loans to banks in Zone B received a 20 percent risk rating only if their term was less than one year; otherwise, they received a 100 percent risk rating (requiring 8 percent capital). These discrete and arbitrary categories had two effects of note: (i) they hurt the borrower who requires longer-term loans, and by the same token increased risk to the lender by increasing likelihood of the borrower's illiquidity; and (ii) they bunched the roll-over risk, putting all lenders at higher risk collectively. The aggregate quantitative evidence does not provide conclusive proof that the Basel Accord influenced the maturity structure of credits (or the distribution of credits between banks and non-banks). However, the data are inadequate to undertake a thorough test of this proposition and such structures must be considered as liable to generate this risk.

While these kinds of features are weeded out once identified, by the same token, the changed rules of the game change the operating environment for financial players, which in turn ensures that the next crisis will reflect some other feature of the system, probably not one at which regulators are staring.

Tighter regulation shifts the action to unregulated markets

The role of information and risk management is to contain the development of excessive risk within the financial system by preventing the creation of "over-exposed" situations. However, the psychology of expansions is such that credit is available at a price – if not from banks in the industrialized economies then from capital market funds or others. Reference need only be made to the markets for junk bonds and the expansion of inter-corporate debt through extension of credit within supply chains to see that this is so. By containing the role of the regulated markets in covering risk, regulation tends to shift the action to unregulated markets. This changes the channels through which contagion flows but does not eliminate it.

Avoiding risk in one area may mean backing into risk elsewhere – a financial market "relativity effect"

Since money is not left to sit idle, a reduction in supply of capital from a major source (internationally active banks) to one set of borrowers is matched by an expansion in supply for others. The feedback-driven overpricing of risk during the Asian/global emerging market crisis (spreads for emerging market debt soared to over 1,000 basis points) was matched by a less-obvious (at the time) under-pricing of risk in the "safe havens" to which supply expanded – principally as it turned out in the U.S. and its technology-driven equity market boom. Thus, the inflation of the dot-com bubble can be seen as the obverse of the bursting of the Asian miracle bubble.

Risk is real and ultimately cannot be avoided

There are a number of propositions that add up to the conclusion that risk is unavoidable and the more effective the shielding of some from risk, the greater the concentration of risk becomes elsewhere.

First, rules designed to reduce risk to the lender inevitably shift the risk to the borrower. While this insulates individual financial institutions from individual risks, it concentrates risks in the borrowing sector which is generally less able to manage risk than is a diversified financial institution. Rules and/or reactions by financial institutions to shut off credit to troubled commercial corporations amplify the problems of the latter leading them to pass on their problems to their suppliers and so forth. The economy slows further, turning liquidity problems into insolvency. In a sufficiently deep downturn, failures in the commercial sector start to cascade creating a problem for the financial system as a whole.

In a similar vein, the desire to avoid risk leads each lender to protect its position with a "carve-out." Generally, the most sophisticated institutions will be best placed to secure their positions, concentrating risk with the less sophisticated. The problem is that, if those who are best placed to absorb and handle risk carry the least amount, those least able to carry risk wind up bearing the full burden. Moreover, the efforts by each individual lender to secure its own position creates a confusing welter of covenants that causes doubt about the value of an asset, impeding the ability of secondary markets to stem a downturn in asset values by attracting bargain hunters.

Third, given imperfect markets, mismatches are inevitable. Insofar as countries are internationally active, current account imbalances and therefore capital account imbalances will be the norm. Because, as a practical matter, markets for hedges are not perfect, someone will carry the risk of being mismatched. Similarly, there is no law of economics that causes the maturity structure of savings to match the maturity structure of optimal investments in an economy. Given the very extensive "home bias" in investment, such mismatches will inevitably be borne within the system. In fact, it is in part to bridge such mismatches that financial institutions arguably owe their existence. If each financial institution avoids these risks, they are concentrated elsewhere and may come home to roost.

Finally, diversification makes bailing out easier; by the same token it makes asset price movements sharper. If a financial institution is highly diversified and has limited exposure, the cost of bailing out of a troubled investment is contained for that financial institution. The trouble is, if all financiers into a troubled investment are diversified and they all bail at the same time on the basis of the same information, they collectively lose far more than if they all stayed put.

Conclusion

The present-day system of financial regulation and supervision is a highly evolved one that incorporates the wealth of experience gained painfully from the lessons of crisis and failure. Insofar as the issues turn around the question of how an individual financial institution should manage its affairs in order to survive and prosper, the state of the art is quite good and efforts to improve it face diminishing returns. In the international domain, where the objective is to encourage the transfer of best practices so as to raise the level of prudential regulation and supervision in developing countries up to the highest available standard, the constraints include the limitations on transferability of specific rules due to the idiosyncratic nature of economic systems, as well as the difficulties associated with maintaining the human capacity to supervise a financial system.

In the area of information, where much of the effort aimed at improving the prudential framework have been focused, there appear to be both diminishing returns at some point and potentially perverse effects that information flows can drive due to the presence of positive feedback loops.

Finally, a range of considerations point to the presence of systemic issues that cannot be addressed through rules designed to preserve the solvency of individual financial institutions. Indeed, insofar as the rules for individual institutions (and greater ability of some institutions to avoid risk) cause system risk to be concentrated amongst those least able to carry it, it may not be possible to further advance the objective of global financial stability through consideration of rules applying to individual institutions. Indeed, since it is concentration of risk that eventually causes difficulties, the better we get at shielding some from risk, the greater the chance of a crisis that affects all.

This raises the question: does all of this add up to a "paradox of risk" that parallels the famous "paradox of thrift"?

(a) Individual risk-taking by financial institutions and markets = stronger growth and more stable clients = lower collective risk.
(b) Individual risk aversion by financial institutions and markets = slower growth less stable clients = greater collective risk.

To get at this question requires that the research effort focus on the interplay between different types of risk (i.e., credit versus liquidity versus market) but also to look at the interplay between management of risk in the financial sector and the impacts of that on the industrial sector, and similarly the effects of management of risk in one economy and the systemic impacts in third economies. Ultimately, it is the interaction of systems to which attention must now be turned.

PART 2

The IFC's New Africa, Latin America, and Caribbean Fund: Its Worrisome Start, and How to Fix It

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Abstract

In April 2010 the International Finance Corporation announced the creation of the African, Latin American, and Caribbean fund, a new co-investment vehicle funded largely with commitments from sovereign wealth and pension funds. The fund's objective was to draw on the IFC and the World Bank's strengths in emerging markets to identify and support enterprises that might not otherwise have come to the attention of large investors and thereby help strengthen the private sector and alleviate poverty in some of the world's poorest countries. Unfortunately the fund has, so far, proven a disappointment. It has invested only in large corporations that were already well known to investors. The fund should return to the principles that seemed to motivate its creation: direct engagement with private enterprises, rather than politically-connected financial intermediaries; leveraging the World Bank's superior knowledge and understanding of emerging markets, rather than investing in corporations listed in London or Frankfurt; and providing capital to small- and medium-sized enterprises that would otherwise not have the support needed to grow and compete nationally or globally.

On April 12, 2010, the International Finance Corporation (IFC) announced the creation of a new fund that will make equity investments in companies in the developing world [Zoellick (2008)]. The new fund, called the Africa, Latin America, and Caribbean fund (or ALAC) is a vehicle through which sovereign wealth funds and pension funds can co-invest with the IFC in equity investments in emerging markets [IFC (2010a)]. The ALAC fund represents the fulfillment of World Bank president Robert Zoellick's call for sovereign wealth funds to direct one percent of their investments to private enterprises in Africa [IFC (2010a)]. Zoellick argued that investments by sovereign funds, if done in partnership with the IFC, could help to transform the economies of many poor countries. The ALAC fund was not a complete fulfillment of Zoellick's vision: he called for investments of approximately U.S.$1 billion in Africa alone; at its inception the ALAC fund had commitments of approximately U.S.$600 million, to be used in Africa, Latin America, and the Caribbean. The ALAC fund is managed by the IFC and is a co-investment fund, meaning that it only invests in projects in which the IFC is also investing [IFC (2010a)]. Consequently, despite being smaller and less focused that Zoellick might have hoped, the ALAC fund is a significant new player in the emerging market equity game, and for this reason alone warrants some attention as it begins its work. It has the potential to substantially influence the nascent but important emerging market private equity industry for good or ill, depending on the kinds of investments it makes and the conditions associated with those investments. In this article, we attempt to accomplish three objectives. The first is to analyze the potential for the ALAC fund to accomplish the IFC's stated goals, particularly in light of the markets in which the fund will make its investments. Second, we review the ALAC fund's initial investments and show that, despite the best intentions, the fund appears not to have learned from past mistakes, making it likely to repeat them. Finally, we conclude by proposing several reforms that, taken together, would increase the likelihood that the ALAC fund's investments would improve the welfare of the people in countries in which it invests.

Do infusions of wealth improve welfare?

It is an article of faith among most – but certainly not all – economic development professionals that poor countries need more wealth transfers to achieve economic development. Different strands of this dominant approach to development focus on transfers in the form of official development assistance, foreign direct investment, or the sale of exploitable natural resources. What unites them is the faith that transferring wealth will improve welfare. The problem with this theory is that the evidence simply does not support it. To be sure, wealth transfers can improve welfare. But it is not inevitable that wealth transfers will improve welfare. What matters more than the kind of transfer are the conditions associated with those transfers.

For wealth transfers to be effective, they must generate the incentives necessary to ensure that the recipients of that wealth use it to benefit ordinary citizens rather than to provide support to the ruling regime or to a small handful of elites. Put slightly differently, wealth transfers are unlikely to be effective tools of development unless someone – investors, citizens, regulators – has the capacity to hold accountable managers of that wealth if they steal, abuse, or misuse it. This accountability could come from an informed citizenry that votes out politicians who misuse the country's resources or from investors who punish poor stewards of wealth. These mechanisms are not novel, but they are also not particularly relevant in many of the places where development has lagged. For example, it is simply not realistic to assume that the citizens of Nigeria will have the information and governance tools necessary to punish their leaders, who have squandered billions of dollars of that country's oil riches. Or for investors in corporations whose supply chains begin – often without the end-user's full knowledge – in the squalid mines of the Democratic Republic of Congo.

To address these real-world problems, it is important to incorporate safeguards that might not be necessary in other investment contexts. Three principles are most important for such a fund. First, the fund should avoid, to the extent possible, channeling funds through governments, either directly or indirectly. The reason for this is to reduce opportunities for politicians to abuse wealth transfers for political purposes or private enrichment. Second, the fund should facilitate direct engagement between managers and the targets of investments. The goal of this is to help transfer knowledge as wealth is transferred and to provide more direct oversight in the target enterprises. In practical terms, this would mean avoiding investments in intermediaries. Third, the fund should aim low: invest in small- and mid-sized enterprises. Such a strategy is inevitably less efficient than targeting large, well-established enterprises, but the IFC's reason for existing, and its role as co-investor, is to handle such inefficiencies.

One strand of the "transfer wealth, improve welfare" approach centers on official development assistance. For some of the world's most influential economists, this means that the governments of relatively wealthy countries should transfer more money to the governments of relatively impecunious countries. Economist Jeffrey Sachs of Columbia University is perhaps the most prominent purveyor of this approach through his advocacy of the Millennium Development Goals. The MDGs were developed by the United Nations as a set of benchmarks, the achievement of which would indicate a significant reduction in poverty and improvement in welfare. For Sachs and others, the principal impediment to the achievement of the MDGs is "the donor shortfall in honoring specific financial commitments to Africa" and other countries [Sachs (2010)].The problem, in other words, is that rich-country governments are not transferring enough money to poor-country governments: were these transfers to occur, then poor countries would be able to pull themselves out of poverty. Even among economists who disagree almost as a matter of course, there is agreement that development assistance has not produced the hoped-for results. For example, William Easterly, a prominent skeptic of development assistance, at least

as it has typically been delivered, has argued that there have been virtually no positive effects from aid [Easterly et al. (2004)]. On this point Easterly agrees with David Dollar, who is much less skeptical of foreign assistance in general, but who also notes that aid has had very little positive effect in recipient countries [Burnside and Dollar (2000)]. In addition, development assistance has not just been less effective than intended. Just as with resource revenue, aid also appears to contribute to a reduction in welfare and an erosion of governance [Knack (2001)]. For example, foreign aid appears to contribute to an increase in official corruption as politicians compete for the control of the wealth [Alesina and Weder (2002)]. Aid dependence can also undermine the quality of a country's institutions of governance and erode democracy [Djankov et al. (2008)]. To be sure, there are examples of development projects that have worked. Nonetheless, over the long term, foreign aid has not contributed to growth [Clemens et al. (2004)].

A second strand of the "transfer wealth, improve welfare" school centers on the potential for resource wealth to transform the economies of poor countries. Countries whose economies are heavily dependent on revenue from the sale of natural resources have not fared as well as countries without such resource wealth. Research on the resource curse, as it is often labeled, has shown that many countries that are heavily dependent on revenue from a single resource have weaker economies, other things equal, than similarly-situated countries that do not possess the valuable resource [Keenan and Ochoa (2009)]. The first, and still leading, article on this issue came from Jeffrey D. Sachs and Andrew M. Warner, who analyzed the role of natural resource wealth in development [Sachs and Warner (1995)]. Sachs and Warner used a database of 97 resource-rich countries and compared each country's growth rate to its level of resource dependence. Even after controlling for a number of other variables, Sachs and Warner found "a statistically significant, inverse, and robust association between natural resource intensity and growth." [Sachs and Warner (1995)]. Although it is typically referred to as the "resource curse" [Auty (1993)], the phenomenon was initially called the "Dutch disease" [Economist (1977)], a term used to describe the effects on an economy resulting from the sale of natural resources [Collier (2007)]. Recent research has shown that resource-dependent economies face a number of other ills: a possible increase in official corruption [Tornell and Lane (1999)], a greater likelihood of conflict [Aslaksen and Torvik (2006)], a misallocation of resources [Robinson and Torvik (2005)], longer tenure for leaders of the ruling regime [Smith (2004)], and reductions in various measures of social welfare.

A final strand of the "transfer wealth, improve welfare" school holds that it is private investment, not official development assistance, that is most likely to help the poorest countries grow. Investment by foreign corporations in poor countries is, of course, not new. What is new is the argument that private-sector investment is a surer path to economic development than official development assistance or the sale of natural resources. Researchers have long known that foreign investment can act as a net drain on the wealth of developing countries [Evans (1971)]. Contrary to the typical assumptions, there is ample empirical evidence demonstrating that FDI often slows growth [Kosack and Tobin (2006)]. This is particularly true in poor countries. Interestingly, resource-rich countries may perform even worse with FDI as private investment can deprive them of monetary gains while, at the same time, diminishing their long-term potential (in the form of retained natural resources) for economic development [Ochoa (2008)].

To evaluate the new ALAC fund it is not sufficient to show that infusions of wealth can reduce welfare. It is also important to identify some of the reasons why this is true. One explanation is that when individuals perceive that there is one and only one way to become wealthy, they follow it to the exclusion of other options. Put another way, rent-seeking amounts to "[c]utting yourself a bigger slice of the cake rather than making the cake bigger." [Bishop (2004)]. When politicians in power can depend on revenue from the sale of a natural resource to fund their regime and the institutions of government, they are relieved of the need to make the politically difficult choices that might support broad-based economic development. For example, when a regime can fund itself by selling natural resources, "the state has less need for taxation of the population, and without the pressure for taxation the state has less need to develop mechanisms of deep control of the citizenry." [Isham et al. (2005)]. In addition, a regime can use unconditioned wealth to support politically useful but economically unsound investments [Kolstad et al. (2009)]. In Nigeria, for example, to placate its supporters, the government has invested heavily in manufacturing. Unfortunately, because the true objective of the government's investments was political, not economic, those investments have contributed little to economic growth. According to one recent empirical study of Nigeria, "two-thirds of the investment in manufacturing by the government is consistently wasted." [Sala-i-Martin and Subramanian (2003)]. When politicians manage assets with only political objectives in mind, they can make bad investment decisions. In perhaps the most complete account of this phenomenon, Michael Ross has shown that politicians in Indonesia, Malaysia, and the Philippines were motivated by the rents available from timber sales and undermined national and local institutions in order to exploit the timber [Ross (2001)]. Similarly, a recent report has demonstrated this phenomenon among Cambodia's ruling elite [Global Witness (2009)].

The ALAC fund's wobbly first steps

The ALAC fund was born of the World Bank's best intentions and is the kind of investment vehicle that could, under the right circumstances, help to improve the lives of some of the poorest people in the world. When the fund was created, World Bank's Robert Zoellick described it as an attempt to harness the "significant savings pool" represented by "pension and sovereign funds" seeking "commercial returns and portfolio diversification." [IFC (2010a)]. The fund is managed by the IFC's Asset Management Company, LLC, a wholly-owned subsidiary of the IFC. Because the

IFC has been slow to release detailed information about the ALAC fund, it is difficult to pinpoint the fund's strategy. When the fund was created, the CEO of the IFC described it as part of the IFC's overall strategy of providing "co-investment opportunities to sovereign and pension fund investors." [IFC (2010a)]. Investors in the fund indicated that they had two objectives beyond earning a return and diversifying their portfolios: greater access to "frontier markets" and "sustainable investment opportunities." [IFC (2010a)].

To date the ALAC fund has announced four investments, three in Africa and one in the Caribbean. It is, of course, difficult to draw any firm conclusions about the fund's strategy based on a small number of investments made over the course of one year. But the initial decisions are not encouraging. Unfortunately the ALAC's funds initial investments are not consistent with the principles that would make it a viable tool for accomplishing its dual goals: facilitating development and poverty reduction, and providing a return to investors. Three of the fund's first four investments have been in financial institutions – intermediaries that are one step removed from the entrepreneurs whose work can actually fuel economic growth. The fourth investment is in a German cement company whose work is largely in infrastructure.

Three of the ALAC fund's first four investments have been in financial services companies. So far the fund has invested in Ecobank Transnational, a bank with operations throughout Africa, Guaranty Trust Bank, a Nigerian bank, and Guardian Holdings, a Caribbean insurance company. The fourth investment is in HeidelbergCement, a German group with substantial operations in West Africa. None of these investments is the kind that is likely to promote ground-level development, avoid the risk of corruption or politicized decision making, and transfer knowledge and expertise to entrepreneurs.

One problem is the size of the fund's investment targets. At first blush there is little reason to be skeptical of investments in these four enterprises. All are well-established players in their respective industries and known to the IFC and other international financial institutions. But it is these very qualities that give us pause. The ALAC fund's investment strategy has been only hazily disclosed, but there are two likely strategies. Either the fund is seeking conventional investments that are attractive to the fund for the same reasons they would be attractive to any other investor, or it is seeking unconventional opportunities that it has reason to believe can deliver a return with sufficient knowledge transfer, oversight, or support. Thus, if the ALAC fund chose its initial investments because they are strong players, well positioned to provide a solid market return on investment, then the fund simply put its money where many other investors would have been willing to put their money.

If the IFC chose its initial targets because they are attractive to the market, then the IFC should have left these investments to the market. This is particularly true of Guaranty Trust Bank, the Nigerian bank that was the recipient of the fund's third investment. Guaranty Trust Bank is listed on the London Stock Exchange (and the Nigerian Stock Exchange), which should provide it with access to necessary capital. This is not to suggest that the fund should never invest in a listed enterprise, but such an investment clearly does not fulfill the IFC's stated goal of using its superior knowledge of emerging markets to identify investment opportunities that other investors would fail to recognize.

The fund's investment in HeidelbergCement is perhaps even more puzzling. HeidelbergCement is the fourth-largest cement company in the world [HeidelbergCement (2010)]. It does business worldwide and is listed on the German stock exchanges. It hardly seems the kind of company that the IFC is uniquely positioned to recognize as a valuable investment target, or the kind of company that needs funds from an international financial institution to signal to the markets that it is a viable enterprise poised for growth. If the ALAC fund was actually seeking to support enterprises with the potential to deliver a return and deliver on the IFC's development mission as well, then the fund chose the wrong targets.

A second problem is that three of the four recipients of investment are financial intermediaries. If the ALAC fund is to be different and more effective than any other private equity investor, then it should focus on small and medium-sized enterprises. Most international financial institutions find it difficult to oversee the quantity of SME investments that would be necessary to have a meaningful impact on development and provide a market return to investors. This concern is real, but the IFC is – or ought to be – different. Its mission is to help alleviate poverty by promoting private sector development. There is surely something to the conventional wisdom that support for regional banks can have a multiplier effect by helping to solidify private equity markets in new areas and signaling international confidence in markets thought to be unstable. But the IFC's goal in creating the ALAC fund was to provide these benefits by taking equity stakes in enterprises that were not otherwise known to most investors; something it has so far failed to do.

A third problem with the fund's initial investments is that it has chosen companies that are sufficiently large to be politically important, and that operate in markets that are sufficiently risky to make them need government favor to thrive. Indeed, two of the reasons the IFC gave for choosing to invest in Guaranty Trust Bank in Nigeria are telling: one was to signal its "confidence in Nigerian banking reforms," and another was to show support for the "Central Bank's initiatives to strengthen the overall banking sector." [IFC (2010b)]. Ecobank, another early recipient of the fund's investment, was accused of complicity in the bloody wars in West Africa as the bank that received payments for illicit timber sales that fueled the war for years [Carvajal (2010), Global Witness (2009)]. Ecobank thrived

because it was connected to those with power, and it has a recent and well-publicized history as banker to warlords. Nonetheless the IFC chose it as one of its initial investment targets.

Conclusion: creating a fund that could make a difference

Putting the ALAC fund on the right path would take courage, but has the potential to do enormous good. The fund should return to the principles that seemed to animate Robert Zoellick's initial vision for such a fund: direct engagement with private enterprises, leveraging the World Bank's superior knowledge and understanding of emerging markets, and providing capital to small- and medium-sized enterprises that would otherwise not have the support needed to grow and compete nationally or globally.

The IFC exists to work with private enterprises, and does so all the time. But its approach to engagement with private enterprises appears to be indifferent to what those enterprises do. One typical argument for development assistance and investment by international financial institutions is that these investments can improve the capacity of host-country institutions and improve the rule of law. Our approach is different. We argue for direct engagement with private enterprises as a way to enable those enterprises to strengthen local institutions. Recent history is rife with examples of development assistance and foreign investment in large, politically-connected firms that resulted in an erosion of local institutions, not an improvement. Our approach would give local enterprises the wherewithal to compete in the marketplace, and thereby enhance the vitality of local communities and create a base for reform of local institutions. The ALAC fund's initial investments are all in large, well-established, politically-connected enterprises with little or no incentive to push for meaningful institutional reform.

When it created the ALAC fund, the World Bank and the IFC indicated that the fund would be a vehicle through which investors could earn a return by relying on the World Bank's superior knowledge of emerging markets and its ability to work directly in some of the most challenging environments in the world. Such a fund would indeed have the potential to generate a market return and fulfill the World Bank's poverty-alleviation mission. Unfortunately, that is not what the ALAC fund has done, at least so far. Based on its initial investments, there is nothing to indicate that the World Bank or the IFC have leveraged any special knowledge, experience, or understanding to identify investment opportunities that would not have been apparent to other investors.

The ALAC fund provided the IFC with an opportunity to strengthen its move toward working with small- and medium-sized enterprises. It is these enterprises that have the best potential to transform emerging economies and actually improve the welfare of local people. Once again, the ALAC fund has not pursued this approach. Instead it has targeted large, well-established enterprises that are not likely to transform local economies or improve the lives of local people.

Based on its track record so far the ALAC fund must be considered a missed opportunity. But if the fund refocused its strategy to work directly with smaller, less politically dependent enterprises, and it began to search for and find investment targets not known to other investors, then it might fulfill its potential.

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PART 2

Regulation Effects on Stock Returns in Shanghai and Shenzhen Exchanges[1]

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Abstract

We compare changes of mean and variance of returns as two regulations have changed between 1992 and 2007 in the Chinese exchanges of Shanghai and Shenzhen. Specifically, we compare the implementation of a ±10% daily return limit versus the absence of any limit, and the effect of allowing local and foreign investors to invest in both type-A and type-B stocks, versus an earlier regimen of clear-cut segmentation. We find that while imposing the ±10% limit significantly reduced total daily variability, it increased the variability of opening returns in Shenzhen. Mean returns at the opening and throughout the trading session changed after the clienteles were merged, but not the total daily return, thereby improving market efficiency.

1 This paper is a synopsis, and extension of a related research project on various patterns of stock returns in both Chinese exchanges. Earlier versions of this project were presented at the 2006 Japanese Economic Association in Osaka City University (autumn meeting), and at the 2008 annual meeting of the Asian Finance Association held in Yokohama Japan. We thank all commentators, and assume full responsibility for any remaining errors.

Chinese financial markets have gradually transformed over the past several years from heavily regulated toward free trade and less supervision. As an opposite swing of a pendulum, the 2008-2010 turbulence in world financial markets, particularly in the U.S. and Europe, expanded the scope of regulation even in the most liberal regimens. Hence, relevant research questions are: (1) to what extent do administrative rules affect stock returns, and (2) does less regulation improve market efficiency? This paper, which is based on results of a broader research project [Kedar-Levy et al. (2010)], addresses these questions with respect to the Chinese exchanges in Shanghai and Shenzhen.

Specifically, we split a dataset of type A and type B stocks traded in both Shanghai and Shenzhen exchanges between 1992 and 2007 according to the presence, and cancelation, of two specific regulations. First, roughly between May 1992 (specific dates are given in the text) and December 15, 1996, no daily return limit applied in both exchanges. Second, trading type A and B stocks was only allowed to local or foreign investors, respectively and exclusively. Therefore, during our "period 1" no daily return limit applied, and investors' clienteles were segmented. Starting December 16, 1996 a daily return limit of ±10% applied in both exchanges, and the clienteles were still segmented, until late November, 2002 for type A stocks and February 2001 for type B stocks. This makes our "period 2." The reminder of our dataset, until December 31, 2007, makes "period 3," where both clienteles were merged, and the ±10% return limit applied.

By comparing means and variances between sub-periods 1 and 2, we explore the impact that the ±10% limit had, and by comparing between sub-periods 2 and 3 we explore whether the change in clientele had any impact on average returns and their variances.

To conduct the study we calculate a few return measures: opening return (prior close to current open prices), trading day return (open to close prices), and total return, which is the sum of the previous two, measured from one closing price to another. We further condition returns based upon the closing sign of the previous day's total return, positive and negative.

Market efficiency and seasonality tests in Chinese markets were explored by many researchers, among them Mookerjee and Yu (1999), Mitchell and Ong (2006), and Chen et al. (2001). Wang and Firth (2004), test for the interaction of Chinese markets with the world, and Sun and Tong (2000), Kim and Shin (2000), and Sun et al. (2009) explored the segmentation of clientele in China. This study is related to the latter topic, extending the period coverage and expanding the scope, as the impact of the ±10% limit was not explicitly examined in other studies.

We report that the ±10% limit had mixed effects. The pattern generating the standard deviation of returns changed in the following way: first, type A opening standard deviations in Shanghai declined from 2.255% to 0.825% (-63%), while those of Shenzhen increased from 0.765% to 0.918%, or 20%. Concurrently, opening standard deviations of type B stocks declined by more that 90% in Shanghai (from 0.888 to 0.061), while increasing about 20% in Shenzhen (from 0.599 to 0.712). This consistent effect in the variability of opening returns in both stock types and both exchanges appears to be related to stale prices. Second, standard deviations were generated predominantly throughout the trading session before and after the limit imposed. However, trading-day variability of type A stocks declined about 50% (from 3.2% to 1.6%) in both exchanges, while the trading-day variability of type B stocks rather increased by more than 50% (from 1.7% to 2.6%).

To summarize, the effect of implementing the ±10% rule on close-to-close standard deviations was a decline of about 50% in the standard deviation of type A stocks, but an increase of about 50% in the variability of type B stocks, in both exchanges. Apparently, foreign investors of type B stocks traded more actively following the rule, presumably preferring some degree of regulation over no regulation in the foreign market they invested in. Concerning the impact on mean returns we find that the ±10% rule had no significant impact on average daily returns, while the joint impact of both regulations changes did affect the opening and/or intra-daily mean returns. Nevertheless, the changes in opening and/or intra-daily returns offset each other, and hence did not change the total, close-to-close rate of return. As a result, regulation changes eliminated a number of potential profitable conditional trading strategies, without affecting the total rate of return. In that respect, the combined changes in the two regulations studied here improved market efficiency.

The dataset

The dataset comprises of open and close prices of value-weighted indexes of type A and type B stocks. The type A stocks sample period starts on May 22, 1992, while the type B stocks sample starts on that date in the Shanghai exchange, but on October 6, 1992 in the Shenzhen exchange. The ending date is December 31, 2007 for both exchanges and both stock types. It should be noted that the Shanghai exchange generally hosts bigger stocks, and the Shenzhen exchange mainly trades smaller stocks. Moreover, type A stocks are denominated in RMB, while type B stocks in Shanghai are traded in U.S.$, and those in Shenzhen are traded in HK dollar. The correlation coefficient between the exchange rates U.S.$/RMB and HKD/RMB was about 0.98 over the examined period, suggesting that our conclusions should be robust to exchange rates effects.

All panels of type A and B stocks are further analyzed in two conditional subsets. Following Rogalski (1984), Bessembinder and Hertzel (1993), Tong (2000), and others, we split the sample into conditional rates of return, conditional on the sign of the prior day return. As noted, to control for the relevant changes in regulation we split the sample into three

sub-periods. During the first sub-period there was no limit on daily stock price changes, in both exchanges and both stock types. The clienteles of both stock types in that period were segmented. A ±10% restriction was in effect throughout the second sub-period, and the clienteles were still segmented. However, during the third sub-period both local and foreign investors were allowed to hold both stock types.

Methodology

To clean the dataset we exclude all observations that are not daily returns, i.e., if the price data are not consecutive for any reason other than weekends, rates of return are excluded for not being daily returns. Rates of return are calculated as follows:

- "Total rate of return," calculated as the natural logarithm of closing prices between t-1 and t: ${}_{c,t-1}R_{c,t} = Ln(P_{Close,t}/P_{Close,t-1})$.
- "Opening return," calculated as the natural logarithm of the return from the previous closing price to the opening price on the following morning: ${}_{c,t-1}R_{o,t} = Ln(P_{Open,t}/P_{Close,t-1})$
- "Trading day return" calculated as the natural logarithm of open-to-close prices of the same trading day ${}_{o,t}R_{c,t} = Ln(P_{Close,t}/P_{Open,t})$.

This implies that the sum of the two latter returns is equal to the first. Overnight information arrival will be reflected in the opening returns, while information that arrives throughout the trading day will affect the mean and variance of the trading day return. If foreign investors (primarily from Europe and the U.S.) are active a few hours after the Chinese exchanges open, they will not affect the opening return, but rather the trading day return.

Comparisons of mean returns are conducted by the Welch two-sample test while comparisons of the variance of returns are conducted by the Levene test for homogeneity of variances. All tests are conducted for the entire period and the relevant sub-periods for type A and type B stocks in both exchanges, as well as for the conditional panels.

		Entire sample		Sub-period 1		Sub-period 2 1996.12.16~2002.11.29		Sub-period 3	
Unconditional		Shanghai	Shenzhen	Shanghai	Shenzhen	Shanghai	Shenzhen	Shanghai	Shenzhen
${}_{c,t-1}R_{c,t}$	Average	0.036	0.039	-0.002	0.046	0.012	-0.014	0.099*	0.095*
	St.deviation	2.559	2.319	3.951	3.281	1.700	1.874	1.522	1.604
${}_{c,t-1}R_{o,t}$	Average	0.037	-0.011	0.093	0.006	0.041	-0.003	-0.021	-0.036*
	St.deviation	1.366	0.747	2.255	0.765	0.825	0.918	0.468	0.447
${}_{o,t}R_{c,t}$	Average	-0.001	0.049	-0.094	0.041	-0.029	-0.011	0.120*	0.126*
	St.deviation	2.158	2.208	3.181	3.157	1.554	1.724	1.457	1.545
	Observations	3756	3740	1136	1119	1408	1409	1212	1212
Conditional: prior return Up									
${}_{c,t-1}R_{c,t}$	Average	0.081	0.124*	0.113	0.120	0.037	0.069	0.103	0.188*
	St.deviation	2.492	2.264	4.076	3.400	1.549	1.735	1.453	1.526
${}_{c,t-1}R_{o,t}$	Average	0.259*	0.129*	0.560*	0.100*	0.207*	0.201*	0.076*	0.075*
	St.deviation	1.327	0.760	2.302	1.036	0.741	0.760	0.403	0.421
${}_{o,t}R_{c,t}$	Average	-0.178*	-0.005	-0.447*	0.021	-0.170*	-0.132*	0.028	0.112*
	St.deviation	2.090	2.108	3.219	3.157	1.496	1.604	1.352	1.440
	Observations	1904	1934	525	533	721	730	658	671
Conditional: prior return Down									
${}_{c,t-1}R_{c,t}$	Average	-0.011	-0.052	-0.102	-0.021	-0.014	-0.104	0.094	-0.020
	St.deviation	2.627	2.373	3.843	3.170	1.847	2.010	1.602	1.690
${}_{c,t-1}R_{o,t}$	Average	-0.193*	-0.162*	-0.312*	-0.080 *	-0.134*	-0.223*	-0.136 *	-0.173*
	St.deviation	1.367	0.702	2.136	0.356	0.871	1.018	0.512	0.441
${}_{o,t}R_{c,t}$	Average	0.183*	0.107*	0.210	0.059	0.120*	0.119	0.230*	0.143*
	St.deviation	2.212	2.310	3.121	3.160	1.601	1.837	1.565	1.668
	Observations	1850	1806	610	586	686	679	554	541

* Asterisks indicate 5% significance

Table 1 – Summary statistics (%, daily rates of return) – type A stocks

Key results

Summary statistics – Type A & B stocks

Table 1, which shows the summary statistics of type A stocks, reveals several distinctions between the two exchanges and the sub-periods. Concerning the unconditional return panel for the entire sample first, it is clear that the overall (absolute) daily return is generated at the opening in Shanghai, but during the trading day in Shenzhen. This pattern maintains in the conditional panels, although it is stronger in Shanghai than in Shenzhen. The standard deviation of total returns is about 10% higher in Shanghai than in Shenzhen. The trading-day variability in Shanghai is higher than that of the opening, while it is the opposite in Shenzhen. These findings might be related to the fact that smaller stocks, which are normally under-covered in the press, are traded in Shenzhen. Hence, many investors respond to press coverage of big stocks, mostly traded in Shanghai, at the opening, while smaller stocks' prices respond to the flow of news throughout the trading day, primarily in Shenzhen. An alternative explanation is described next concerning segmented clientele effects.

The first two sub-periods are the source for this pattern in the entire sample: absolute returns and their variances are generated at the opening in Shanghai but during the trading day in Shenzhen. The primary difference between sub-periods 1 and 2 is a sharp decline (about 50%) in the standard deviations of both the conditional and unconditional panels of type A stocks, as expected following the implementation of the ±10% daily return limit in sub-period 2. However, total return standard deviations of all panels, conditional and unconditional, of type B stocks rather increased following the change. While the increase in opening variability (in Shenzhen) is explained in a lower proportion of stale prices, as detailed below, the increase in trading day variability in both exchanges appears to be related to higher trading activity of foreign investors. Unfortunately, we could not obtain matching volume data to validate this assumption.

During sub-period 3, when both stock types were allowed to all investors, unconditional returns are generated throughout the trading day in both exchanges (0.120% and 0.126% in Shanghai and Shenzhen,

		Entire sample		Sub-period 1		Sub-period 2		Sub-period 3	
		Shanghai	Shenzhen	Shanghai	Shenzhen	Shanghai	Shenzhen	Shanghai	Shenzhen
Unconditional									
$_{c,t-1}R_{c,t}$	Average	0.030	0.039	-0.042	0.010	0.022	-0.037	0.084	0.102
	St.Deviation	2.258	2.210	1.948	1.897	2.696	2.618	2.168	2.121
$_{c,t-1}R_{o,t}$	Average	-0.005	0.033*	-0.024	0.004	-0.006*	0.034	0.008	0.050*
	St.Deviation	0.714	0.699	0.888	0.599	0.061	0.712	0.789	0.748
$_{o,t}R_{c,t}$	Average	0.035	0.006	-0.018	0.006	0.028	-0.071	0.076	0.052
	St.Deviation	2.169	2.135	1.770	1.741	2.696	2.604	2.062	2.042
	Observations	3749	3633	1135	1020	984	983	1630	1630
Conditional: prior return up									
$_{c,t-1}R_{c,t}$	Average	0.359*	0.312*	0.460*	0.307*	0.372*	0.415*	0.290*	0.262*
	St.Deviation	2.272	2.273	2.045	2.330	2.636	2.480	2.183	2.128
$_{c,t-1}R_{o,t}$	Average	0.090*	0.128*	0.053	0.005	-0.008*	0.153*	0.167*	0.178*
	St.Deviation	0.763	0.764	0.934	0.514	0.058	0.813	0.846	0.836
$_{o,t}R_{c,t}$	Average	0.270*	0.184*	0.407*	0.303*	0.379*	0.261*	0.122	0.084
	St.Deviation	2.174	2.208	1.872	2.124	2.641	2.554	2.047	2.050
	Observations	1781	1732	506	436	459	441	816	855
Conditional: prior return down									
$_{c,t-1}R_{c,t}$	Average	-0.275*	-0.224*	-0.447*	-0.222*	-0.285*	-0.422*	-0.135	-0.087
	St.Deviation	2.195	2.102	1.768	1.449	2.715	2.645	2.109	2.075
$_{c,t-1}R_{o,t}$	Average	-0.092*	-0.056*	-0.086*	0.006	-0.005*	-0.068*	-0.154*	-0.092*
	St.Deviation	0.655	0.620	0.845	0.658	0.057	0.594	0.690	0.606
$_{o,t}R_{c,t}$	Average	-0.182*	-0.168*	-0.361*	-0.228*	-0.280*	-0.354*	0.019	0.006
	St.Deviation	2.136	2.040	1.605	1.339	2.710	2.601	2.060	2.013
	Observations	1965	1891	628	576	524	541	813	774

* Asterisks indicate 5% significance

Table 2 – Summary statistics (%, daily rates of return) – type B stocks

respectively), while the opening returns are slightly negative (-0.021% and -0.036%). This finding implies that the different clienteles generated the effect on average returns, while the ±10% return limit affected the variance, but not the mean.

An additional consistent pattern in intra-daily returns is a significant reversal effect between the conditional opening return, and the intraday return. During both sub-periods 1 and 2, conditional opening returns, which were strongly positive following a positive closing or strongly negative following a negative closing, reversed throughout the trading day. The effect was significant and more persistent in Shanghai. Yet, during sub-period 3, opening returns following a positive return were indeed positive, but they continued the momentum into the trading day in both exchanges, rather than reverse. Nevertheless, negative opening returns following a negative closing did reverses in both exchanges, rather than exhibit a momentum. A similar pattern was found in type B stocks during the third period.

The summary statistics for type B stocks, presented in Table 2, deliver a striking finding where the standard deviation of type B stocks increased following the ±10% limit, rather than decline. Kedar-Levy et al. (2010) argue that this is a result of changes in the proportion of stale prices at the opening, as high proportions of zero opening returns mitigate the measured variance [see Tsutsui (2003) with respect to stale prices in Tokyo]. They found that during the first sub period about 69% of opening returns in Shanghai and 78% in Shenzhen were zero, but during the second sub period this proportion increased to 93% in Shanghai but declined to 20% in Shenzhen. This opposite change in the proportions of stale prices at the opening explains why the opening variability in Shanghai declined, but in Shenzhen increased.

The standard deviation was generated both at the opening and throughout the trading day before the ±10% rule applied, where the latter is about twice the former. Yet, after the change the Shanghai opening standard deviation declined by more than 90% (from 0.888 to 0.061), while it increased about 20% in Shenzhen (from 0.599 to 0.712). Still, standard deviation was generated predominantly throughout the trading session after the limit was imposed, about 2.6% in both exchanges.

Regulation changes and mean returns

Comparing mean returns across the first two sub periods, particularly subtracting period 2 returns from the first period's returns reveal no systematic or significant differences. Subtracting period 3 returns from those of period 2, hence accounting for changes of returns as both foreign and local investors were segmented versus merged, does reveal a few significant changes. All significant changes were found in opening or intra-daily returns, but not in total, close-to-close returns other than one case in type B stocks. This case, in the conditional on negative prior return, stems from an increase in trading day return in Shenzhen in period 3 versus period 2.

Conditional opening and intra-daily type A returns following a positive return were found significantly different between periods 2 and 3, in both exchanges. High positive opening returns of about 2% during period 2

	Comparing sub-periods: 1 minus 2		Comparing sub-periods: 2 minus 3		Comparing sub-periods: 1 minus 3	
	Shanghai	Shenzhen	Shanghai	Shenzhen	Shanghai	Shenzhen
Unconditional						
$_{c,t-1}R_{c,t}$	-0.014	0.061	-0.087	-0.109	-0.100	-0.049
$_{c,t-1}R_{o,t}$	0.051	0.009	0.062*	0.033	0.114	0.042
$_{o,t}R_{c,t}$	-0.065	0.052	-0.150*	-0.137*	-0.215*	-0.085
Conditional: Prior return Up						
$_{c,t-1}R_{c,t}$	0.076	0.051	-0.066	-0.119	0.010	-0.067
$_{c,t-1}R_{o,t}$	0.353*	-0.101	0.130*	0.126*	0.483*	0.025
$_{o,t}R_{c,t}$	-0.277	0.153	-0.198*	-0.244*	-0.475*	-0.092
Conditional: prior return down						
$_{c,t-1}R_{c,t}$	-0.089	0.083	-0.108	-0.083	-0.196	-0.001
$_{c,t-1}R_{o,t}$	-0.179	0.143*	0.002	-0.050	-0.176*	0.093*
$_{o,t}R_{c,t}$	0.090	-0.060	-0.110	-0.023	-0.020	-0.084

* Asterisks indicate 5% significance

Table 3 – Welch two sample t-tests – type A stocks

	Comparing sub-periods: 1 minus 2		Comparing sub-periods: 2 minus 3		Comparing sub-periods: 1 minus 3	
	Shanghai	Shenzhen	Shanghai	Shenzhen	Shanghai	Shenzhen
Unconditional						
c,t-1Rc,t	-0.063	0.047	-0.062	-0.139	-0.125	-0.092
c,t-1Ro,t	-0.018	-0.030	-0.014	-0.016	-0.032	-0.046
o,tRc,t	-0.045	0.077	-0.048	-0.123	-0.093	-0.046
Conditional: prior return up						
c,t-1Rc,t	0.089	-0.107	0.082	0.152	0.171	0.045
c,t-1Ro,t	0.061	-0.149*	-0.175*	-0.025	-0.114*	-0.174*
o,tRc,t	0.028	0.042	0.257	0.177	0.285*	0.218
Conditional: prior return down						
c,t-1Rc,t	-0.162	0.199	-0.150	-0.335*	-0.312*	-0.135
c,t-1Ro,t	-0.0807*	0.074*	0.149*	0.024	0.068	0.098*
o,tRc,t	-0.081	0.126	-0.299*	-0.359*	-0.380*	-0.233*

* Asterisks indicate 5% significance

Table 4 – Welch two sample t-test: sub-periods comparisons – type B stocks

declined to about 0.75% during period 3. This decline was offset by an increase in trading-day return, from -1.70% (SH) and -0.132% (SZ) to 0.028% and 0.112%, respectively. A similar pattern was found for type B stocks in Shanghai, but not in Shenzhen.

The change in close-to-close type A returns between periods 2 and 3 was insignificant in the unconditional panel. This result stems from the finding that significant changes between opening and closing conditional returns canceled each other.

A comparison of mean returns between sub periods 1 minus 3 shows significant changes between opening and closing returns in the conditional panels, with only one significant decline in trading day return in the unconditional panel of type A stocks in Shanghai. No significant changes were found in the unconditional panel of type B stocks. This finding implies that while regulation changes affected opening and/or intra-daily mean returns, their impact on the total rate of return was not significant.

While changes in mean total returns across sub-periods were not significant, both Chinese exchanges became more efficient after the two clienteles were merged. This is evident by the smaller return differentials between many of the conditional opening and intra daily returns. For example, investors could short (buy long) type A stocks at the opening conditional on a prior positive (negative) change and gain 0.170% (0.120%) in Shanghai or 0.132% (0.119%) in Shenzhen, during period 2. However, had they bought the index during period 3 conditional on positive prior change, they would have gained only 0.028% in Shanghai. Nevertheless, both markets' efficiency can and should further improve, as profitable conditional trading was still feasible during the last period of our study. For example, by trading following negative price changes investors could gain 0.230% in Shanghai or 0.143% in Shenzhen, or if trading following a positive close they could gain 0.112% in Shenzhen (ignoring transaction costs).

Regulation changes and the variance of returns

Changes in the variance of returns are measured by the Levene test for the homogeneity of variances. As expected, almost all measures of return variances, in the unconditional, and two conditional panels, in both exchanges, and both stock types have significantly changed between sub periods 1 and 2. The results, presented in Table 5 for type A stocks and Table 6 for type B stocks, are all significant except for two opening conditional return variances in SZ. Recall, however, that not all variances declined, particularly for type B stocks, as discussed in the previous section.

A more complex effect was found between periods 2 and 3, as the segmented clienteles merged. As the right panel of Table 5 demonstrates, unconditional opening return variances of type A stocks changed significantly (about 40% decline) in both exchanges. The decline in Shanghai was marginally significant (about 10%) in the opening of the two conditional panels, but the joint effect turned the unconditional opening return significantly lower after the clienteles merged. This change cannot be attributed to the stale price effect in type A stocks simply because there were almost none in Shanghai in both sub periods 2 and 3. Type A stocks traded in Shenzhen faced an even greater decline in their opening return variance, about 50%, between periods 2 and 3, and indeed these declines are highly significant (Table 5, right panel).

	Comparing sub-periods: 1 versus 2		Comparing sub-periods: 2 versus 3	
	Shanghai	Shenzhen	Shanghai	Shenzhen
Unconditional				
$_{c,t-1}R_{c,t}$	0.000	0.000	0.391	0.114
$_{c,t-1}R_{o,t}$	0.000	0.012	0.010	0.000
$_{o,t}R_{c,t}$	0.000	0.000	0.976	0.399
Conditional: prior return up				
$_{c,t-1}R_{c,t}$	0.000	0.000	0.861	0.551
$_{c,t-1}R_{o,t}$	0.000	0.150	0.056	0.004
$_{o,t}R_{c,t}$	0.000	0.000	0.603	0.543
Conditional: prior return down				
$_{c,t-1}R_{c,t}$	0.000	0.000	0.376	0.185
$_{c,t-1}R_{o,t}$	0.000	0.000	0.108	0.001
$_{o,t}R_{c,t}$	0.000	0.000	0.612	0.596

P-Value<5% (bold font), indicates significant dissimilarity of return variance

Table 5 – Levene's test – type A stocks

	Comparing sub-periods: 1 versus 2		Comparing sub-periods: 2 versus 3	
	Shanghai	Shenzhen	Shanghai	Shenzhen
Unconditional				
$_{c,t-1}R_{c,t}$	0.000	0.000	0.000	0.000
$_{c,t-1}R_{o,t}$	0.000	0.000	0.000	0.000
$_{o,t}R_{c,t}$	0.000	0.000	0.000	0.000
Conditional: prior return up				
$_{c,t-1}R_{c,t}$	0.000	0.001	0.000	0.046
$_{c,t-1}R_{o,t}$	0.000	0.000	0.000	0.671
$_{o,t}R_{c,t}$	0.000	0.000	0.000	0.009
Conditional: prior return down				
$_{c,t-1}R_{c,t}$	0.000	0.000	0.000	0.000
$_{c,t-1}R_{o,t}$	0.000	0.072	0.000	0.000
$_{o,t}R_{c,t}$	0.000	0.000	0.000	0.001

P-Value<5% (bold font), indicates significant dissimilarity of return variance

Table 6 – Levene's test – type B stocks

The impact of merging the clienteles on the variances of type B stocks was significant throughout – on the conditional, and unconditional panels, on opening, trading day, and total returns, and in both exchanges. However, the direction of the change in standard deviations was not homogenous:

- The variability of total returns, conditional and unconditional, declined about 30% from period 2 to 3.
- The variability of opening returns, both conditional and unconditional, increased by an order of magnitude for type B stocks traded in Shanghai, but it increased 5-10% for stocks traded in Shenzhen.
- The variability of trading day returns decreased about 20%, from a level of 2.5-2.7% to about 2.0%, in unconditional and conditional panels, and in both exchanges.

The increase in the variability of opening type B returns between periods 2 and 3 is attributable to the decline in the proportion of stale opening prices. The decline in trading day standard deviations is probably attributable to the ability of local investors to trade on local news at the opening, rather than have foreign investors react to local news only late into the trading session, thereby affecting the closing price, but not the opening price.

Summary

This study examined the impact that two regulation changes had on the Shanghai and Shenzhen exchanges between 1992 and 2007. By segmenting the full period into three sub periods we differentiate between the first period, where local and foreign investors could invest in either type A or type B stocks, respectively, and daily return changes were not bound. During the following period, while the clienteles were still segmented, a ±10% daily return limit was imposed, allowing us to compare the impact of that rule with the first period. However, during the third period both investor types were allowed to invest in either stock type, allowing us to explore the impact of merging the clienteles given the ±10% limit.

Counter-intuitively we find that while the ±10% limit indeed reduced the variance of opening returns in the Shanghai exchange, the variance of opening returns in Shenzhen rather increased, for both stock types. This effect appears to be due to stale prices. However, while the impact of merging the clienteles on the variances of type B stocks was significant throughout, the direction of the change in standard deviations was not homogenous. In particular, the variability of total returns, conditional and unconditional, declined about 30% from period 2 to 3, but the variability of opening returns, both conditional and unconditional, increased by an order of magnitude for type B stocks traded in Shanghai, but it increased only 5-10% in stocks traded in Shenzhen.

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Operational Risk Management Using a Fuzzy Logic Inference System[1]

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Abstract

Operational Risk (OR) results from endogenous and exogenous risk factors, as diverse and complex to assess as human resources and technology, which may not be properly measured using traditional quantitative approaches. Engineering has faced the same challenges when designing practical solutions to complex multifactor and non-linear systems where human reasoning, expert knowledge, and imprecise information are valuable inputs. One of the solutions provided by engineering is a Fuzzy Logic Inference System (FLIS). The choice of a FLIS for OR assessment results in a convenient and sound use of qualitative and quantitative inputs, capable of effectively articulating risk management's identification, assessment, monitoring, and mitigation stages. Different from traditional approaches, the proposed model allows for evaluating mitigation efforts ex-ante, thus avoiding concealed OR sources from system complexity build-up and optimizing risk management resources. Furthermore, because the model contrasts effective with expected OR data, it is able to constantly validate its outcome, recognize environment's shifts, and issue warning signals.

1 The opinions and statements are the sole responsibility of the authors. This paper is the result of years of research and development first established by the Foreign Reserves Department and followed by the Operations and Market Development Department, at the International and Monetary Affairs Division of Banco de la República (Colombia's Central Bank). The herein presented model is still under implementation; hence some practical enhancements could arise in the process. Authors are grateful to the staff involved in this process.

2 Involvement in this paper is limited to his previous position as Senior Researcher, International and Monetary Affairs Division, Banco de la República.

International risk management practices for financial institutions focuses on three main risk categories: market risk (MR), credit risk (CR), and operational risk (OR). The first two categories have a broad literature and, despite the recent financial turmoil, there exists some degree of consensus about the main characteristics a management model should fulfill in order to be considered useful. Meanwhile, in spite of being present in all financial institution's activities and notwithstanding the fact that it accounts for some of the biggest losses in history [Moosa (2007), Gallati (2003)], there is less progress and consensus about what an OR management model should be.

For example, Basel Committee on Banking Supervision (BCBS) has chosen not to employ a soundly based model for calculating capital requirements due to OR. BCBS proposal consists of an overall α% charge to the bank's gross income as a proxy for OR exposure (basic indicator approach), or to apply a β_i% charge to a standardized list of business units and business lines within the firm, where each unit or line (i) has its own gross income figure and is assigned a different charge (standardized approach). Not only do both alternatives rely on the assumption of linearity of OR with the size of the banks or business activity [Pézier (2003)], neither alone creates an incentive for better OR management.

The vast majority of models, including the aforementioned BCBS' approaches, are designed for capital requirement calculations only. They are not intended for risk management, which should fully entail the identification, assessment, monitoring, and mitigation of OR. Moreover, traditional models are incapable of capturing the effects of risk management decisions, making it impossible to evaluate their expected outcomes.

There are numerous reasons why OR management's theoretical and practical developments have been less than MR and CR. Most of the reasons share a common thread, namely the fact that the unique characteristics of OR require models to not only deal with quantitative, but also with qualitative information – a rather difficult task.

Taking into account the unique characteristics of OR this document develops a model which allows using qualitative and quantitative inputs in order to attain an expected OR figure. The chosen model, a Fuzzy Logic Inference System (FLIS), takes advantage of years of successful engineering experience when solving non-linear systems, multifactor problems, and using expert knowledge or subjective information as inputs.

The main advantage of the model is a sound and consistent treatment of qualitative and quantitative information, along with the ability to integrate the assessment process to the identification, monitoring and mitigation of OR, which allows the implementation of a rather complete OR management framework. Additionally, contrary to the traditional approaches, the proposed estimation of the expected OR figure allows for the effective measurement and evaluation of the expected outcome of risk management decisions, preserving in this way the true preventive nature of risk management. Finally, because the model contrasts effectively with expected OR data, it is able to constantly validate its outcome, recognize environmental shifts, and issue warning signals.

Characteristics and challenges of operational risk (OR)

BCBS (2003) defines OR as the risk of loss resulting from inadequate or failed internal processes, people, and systems or from external events, including legal risk, but excluding strategic and reputational risk. Despite BCBS' effort to provide a standard definition for regulatory purposes, OR is still an unclear concept. According to Moosa (2007), Holmes (2003), Gallati (2003) and Medova and Kyriacou (2001), this has encouraged "residual" definitions which term OR as those types of risk that could not be classified as either CR or MR.

Since a negative or residual definition of OR is difficult to work with [Moosa (2007)] and because it is expected that the BCBS – taking into account industry's feedback – will include reputational risk [Gallati (2003)], this document embraces the following OR definition: failure to meet an operational target or objective with resulting losses being monetary or reputational, due to events such as inadequate or failed internal process, people, and systems or from external events.[3] This definition also tries to avoid focusing on the underlying known causes and the resulting known losses which results in the restriction of the universe of causes and losses to past observations [Moosa (2007), Gallati (2003)]. It aims to focus on the failure to comply with the firm's operational objectives as the core issue, without unnecessarily restricting the causes or the results, as is the case with most quantitative approaches to OR. It is rather clear that OR includes non-linear, multidimensional, heterogeneous, and untypical factors – such as the human factor. Consequently, it is a broad, complex, and unclear topic, more involved than CR or MR.

Nevertheless, it is always tempting to use CR and MR quantitative approaches to assess OR. Presumably, as asserted by Pézier (2003), this is an effort to facilitate the role of the supervisor. Unfortunately such temptation comes with severe limitations. Five main characteristics of OR may explain this fact:

- **Historical information is scarce –** unlike MR and CR, OR losses data is particularly scarce. This is due to the fact that the most relevant OR losses are of the low-frequency-high-impact type, which makes traditional quantitative approaches based on loss experience difficult at best [Austrian Nationalbank (2006), Shah (2004), Alexander (2003),

3 This is similar to the European Commission (2006) definition because it does not exclude reputational risk, but makes explicit that the losses may be monetary or reputational.

Gallati (2003), Holmes (2003), BCBS (2001)]. A traditional decision to surmount this problem is using industry's (external) information. This alternative is not trouble-free because it assumes the existence of a common loss distribution for the whole industry and because some qualitative and quantitative methods could be necessary in order to make this information meaningful [BCBS (2004)]. Additionally, as asserted by Moosa (2007), industry's information may be inaccurate just because it is dubious that firms will make their entire operational loss data publicly available. They will be tempted to make public those loss events that become public via different media, only. Holmes (2003) also highlights that data scarcity results in serious difficulties for validating or backtesting OR models, thus reducing their reliability or usefulness in predicting future outcomes.

- **Historical information is not relevant –** besides scarce, OR data is highly context-dependent. Context-dependency determines how relevant past data is to the system under analysis: if a system changes rapidly, the predictive ability of a model based on past data is quite limited. OR context-dependency is explained by the continual change of organizations, the evolution of the environment in which they operate, and because of extremely changing factors such as human resources and technology. As Holmes (2003) states, CR and MR show a moderate level of context dependency, with statistical properties somewhat stable and reliable, whilst OR statistical properties are rather dynamic. Scandizzo (2000) highlights that the problem may not be the ability of a model to quantify a stable distribution of OR losses, but questions the mere existence of such a distribution. As Scandizzo (2005) asserts, high-severity-loss events are not very useful in modeling future exposure, as the risk and control environment, and hence the statistical distribution underlying such events, changes sharply immediately thereafter. Furthermore, because OR comprises factors such as training or professional experience, assessing OR involves a subjective and qualitative components not easily captured by traditional quantitative approaches [Scandizzo (2000)].

- **Uncertainty about OR exposure and portfolio completeness –** whilst MR and CR exposure stem from clear-cut transactions such as the mark-to-market of a currency position or the nominal value of a loan, OR exposure (or size) is not clear and is not explicit. OR arises from the mere existence of the firm and does not arise exclusively from a given transaction. As exemplified by Holmes (2003), two banks with identical asset and liabilities portfolios, with identical counterparties and instruments, will exhibit exactly the same MR and CR, but may differ significantly in their OR. This reinforces the previously mentioned non-relevance of external information. Consequently, it is difficult to be certain of the OR exposure and portfolio completeness, particularly when relying on loss experiences as a means for inferring loss distributions and assessing OR. In this sense, using losses experience, either internal or external, assumes that the only OR causes and effects are those found in the data sample; all other sources and effects of OR are inconveniently discarded.

- **Unclear links between risk factors and OR losses –** unlike MR and CR, for OR there is not a direct and clear link between the exposure and the likelihood or size of losses [Gallati (2003), Holmes (2003), Shah (2002), Scandizzo (2000)]. For example, MR has linear and non-linear approximations to risk sensitivity, such as a bond's duration and convexity or an option's delta and gamma, which clearly link exposure to losses. As pointed out by Scandizzo (2000), no mathematical models or pricing equations are available that rigorously link the occurrence of a particular OR factor to the market value of a financial institution or with the amount of loss that can actually be incurred.

- **Difficulties when capturing the effect of risk management decisions –** MR and CR management decisions (i.e., hedging or unwinding a position) directly and clearly affect the risk exposure of the firm. Due to OR's complex and diverse risk factors and the inability of traditional quantitative approaches to evaluate the effect of changes in factors such as training, professional experience, processes, controls, or technology, it is unlikely that mitigation decisions result in a truly updated OR figure. As Scandizzo (2005) argues, MR and CR managerial decisions affect the resulting risk profile directly and in a manner that measurement models have no problem capturing. Differently, OR measurement managerial decisions may affect the risk profile in a number of different ways, none of which the typical measurement models can capture in a simple and direct manner; statistical approaches in particular will be unable to take into account such changes, as historical data will reflect a risk and control environment which no longer exists. Remarkably, because of the non-linear and unique nature of OR factors, genuine mitigation efforts may even yield undesired outcomes. A firm willing to reduce OR may be tempted to undertake as much mitigation efforts (i.e., implementation of additional controls, new software, etc.) as possible; nevertheless, due to the intricacy of ex-ante evaluation of OR management decisions, the firm may be creating a system complexity build-up[4], thus fostering the rise of an unnoticed, yet potentially significant, source of OR.[5] It is also important to highlight that using past operational losses data

4 The system complexity build-up arises from the additional interactions created by the implementation of mitigation efforts. The implementation of a new control (i.e., a new software) to mitigate OR may create new sources of OR, which may arise from the new control itself or from its interaction with other controls or processes.

5 This is akin to the decision of a firm to hedge via a complex derivative instrument. Despite its market risk exposure being potentially reduced, if the derivative's expertise of the firm is not adequate the complexity of the chosen instrument may result in an undesired or unplanned outcome. As presented by Dowd (2003), the use of sophisticated techniques for mitigating CR and MR (i.e., collateralization, netting, credit derivatives, asset securitization) may transform these risks into operational risks.

and statistical methods may yield risk measures, such as an OR Value at Risk or capital charges, but will be useless when trying to manage OR [Pézier (2003), Cruz (2002)]. It is crucial that OR models capture the expected effect of risk management decisions.

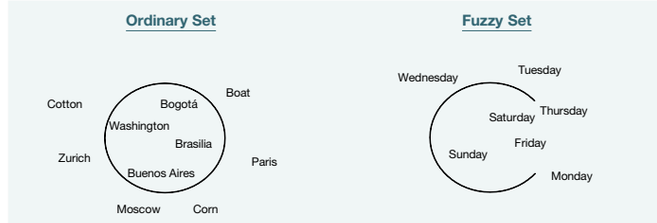
The aforementioned characteristics validate the departure from MR and CR management techniques. Such quest for non-purely-quantitative approaches has yielded diverse approaches, which can be classified according to their degree of reliance on data analysis and expert knowledge – the poles of the purely quantitative and purely qualitative models, respectively. Shah (2003, 2002) identifies the dynamic and endogenous nature of OR as the main motivation for using expert knowledge in order to overcome purely quantitative approaches' flaws. According to Shah, models capable of combining expert knowledge with data analysis are better suited for modeling OR.

Applications based on expert knowledge are not new, and are typical of disciplines different from finance and economics, such as engineering. When dealing with complex systems, where information is incomplete or imprecise, especially when humans are involved, control engineering has successfully relied on fuzzy logic (FL).[6]

It is important to highlight that FL is by no means a replacement for quantitative approaches when assessing OR losses, but a complement which deals with the complex and non quantitative information content of OR factors. Hence, Cruz (2002) asserts that FL does not compete with mathematical probability theory as means of evaluating random events or estimating an OR VaR, but rather can be regarded as a complement for dealing with real-world problems in which the available information is subjective, incomplete, or unreliable, and when systems are non-linear, making it possible to in this way understand OR correlations and causalities.

Fuzzy logic (FL) and fuzzy logic inference systems (FLIS)

The fundamental concept of ordinary sets is "membership" which states that an element belongs or not to a set. This type of sets, described by unambiguous definition and boundaries, is known as ordinary or crisp sets. These sets are characterized by discrete-bivariate membership (yes or no, 1 or 0, true or false) and classic, Boolean, or Aristotelic logic. In contrast to ordinary sets, Zadeh (1965) acknowledged the fact that in reality there are elements characterized by membership functions which are not discrete, but continuous, where different degrees of membership exist between yes or no, 1 or 0, true or false. This type of sets have unclear boundaries, therefore Zadeh named them fuzzy sets. As stated by Sivanandam et al. (2007), the main contribution of the fuzzy set concept is the ability to model uncertain and ambiguous information, the kind of information frequently found in real life.



Source: authors' design, based on Mathworks (2009)

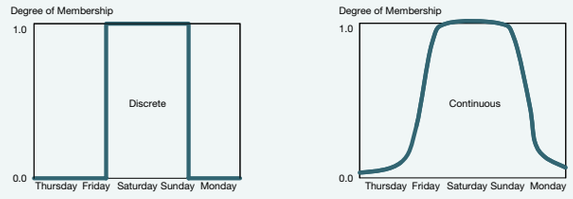
Figure 1 – An ordinary and a fuzzy Set

A plain example of an ordinary set is presented in the left side of Figure 1. There are ten concepts, with which we try to define the "American cities" set. It is straightforward that only Bogotá, Brasilia, Buenos Aires, and Washington can be regarded as members of such set. For ordinary sets there is no uncertainty about the applicable boundaries.

A plain example of a fuzzy set is presented in the right side of Figure 1, where we try to establish the membership of the days of the week to the "week-end" set. In this example it is impossible to unambiguously assign a discrete membership to the week-end set for each one of the days of the week. For example, many individuals will include Friday as the beginning of the week-end, some others will define it as the end of Friday's working hours, and others when the clock's minute and hour hands meet at Friday's midnight. It can be seen that the membership of the elements to the set is not clearly bounded, is a matter of degree. Consequently, it is better described by a fuzzy set. Figure 2 shows how this example is represented through the membership concept.

It is important to emphasize the fact that ordinary sets can be regarded as a particular case of fuzzy sets, in which degrees of membership are restricted to two extreme alternatives: 0 or 1 [Bojadziev and Bojadziev (2007), Klir and Yuan (1995)]. In the previous example, the transition from a bivariate to a multivariate membership allows us to better define the characteristics of an element, with clear gains in terms of ability to describe real-life cases and imprecise concepts. The lines used in Figure 2 to describe the membership – either discrete or continuous – of elements to a set are known as membership functions. A membership function is the line which defines the transition between sets, thus mapping the degree of membership of the elements of such sets. A continuous membership

6 According to Cruz (2002), FL has been applied extensively in the real world, mostly in an engineering context, to control systems where the timing and level of inputs are at least to some extent uncertain. Everyday applications of FL include medicine, automotive industry, water treatment, air and ground traffic control, military sonar, nuclear fusion, and home appliances design. FL has been used in the finance industry too, mainly in insurance and credit card fraud detection, credit risk analysis, money laundering, and other types of financial crime [Sivanandam et al. (2007), Austrian Nationalbank (2004), Hoffman (2002), von Altrok (2002), Bundesbank (1999), Klir and Yuan (1995).



Source: authors' design, based on Mathworks (2009)

Figure 2 – Days of the week as discrete and continuous membership

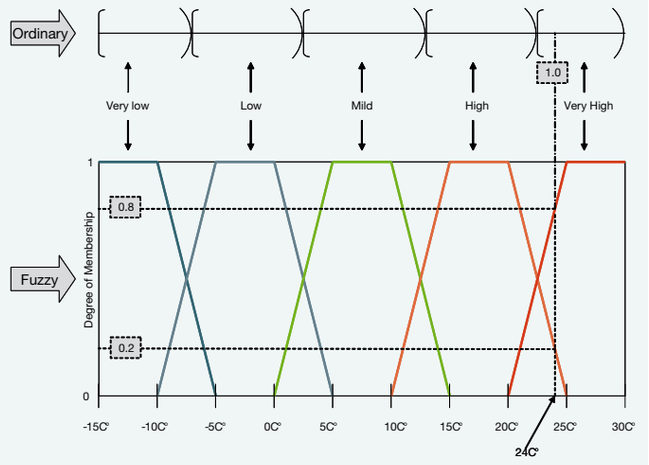
function, typical of fuzzy sets, recognizes that elements may belong to different categories in some degree, with this degree varying in a smooth and continuous manner. Consequntly, as pointed out by Sivanandam et al. (2007), fuzzy sets theory allows for dealing with imprecise or vague information within a quantitative approach.

There exists a wide variety of membership functions. The most used and practical is the triangular membership function, characterized by its simplicity and low information requirements [Bojadziev and Bojadziev (2007), McNeill and Thro (1994)]. However, there exist other functions such as trapezoidal, Gaussian, sigmoidal, and polynomial, where higher complexity comes with higher information content. The next figure represents temperature as an ordinary and as a fuzzy set where the latter uses five trapezoidal membership functions.

Figure 3 evaluates the degree of membership for the 24C° temperature, where five categories exist: very low, low, mild, high, and very high. If the temperature is considered as an element of an ordinary set (upper section of Figure 3) 24C° would be considered unambiguously (100%) as a very high temperature, although being somewhat close to the level where it could be considered as high. A change of a couple of degrees would result in an abrupt change of category. If considered as an element of a fuzzy set (lower section of Figure 3) 24C° would be regarded as 80% very high and 20% high, and this membership would vary smoothly and continuously as temperature changes.

The process just presented, converting a crisp quantity to the appropriate fuzzy sets through the use of membership functions, is known as fuzzification [Sivanandam et al. (2007), Klir and Yuan (1995), McNeill and Thro (1994)]. According to Klir and Yuan (1995) the gain of fuzzification is greater generality, higher expressive power, an enhanced ability to model real-world problems, and, most importantly, a methodology for exploiting the tolerance for imprecision; besides, although the use of ordinary sets is mathematically correct, it is unrealistic and unpractical.

The choice of the membership function is somewhat arbitrary but should be done with simplicity, convenience, speed, and efficiency in



Source: authors' design, based on Klir and Yuan (1995)

Figure 3 – Temperature as an ordinary and as a fuzzy set

view. Mathworks (2009) and Cox (1994) emphasize that special attention should be drawn to the overlapping between membership functions: the overlapping is a natural result of fuzziness and ambiguity associated with the segmentation and classification of a continuous space. Cox (1994) also highlights that FL models are rarely sensitive to the membership function choice, making them quite robust and resilient, which is an important property when models are initially prototyped.

Concerning the logic used to evaluate propositions, ordinary sets rely on ordinary logic. This type of logic, also known as classical, Aristotelic or Boolean logic, conceives the universe in terms of well-structured categories, where an item is either a member of a set or not. Using the logical operators AND, OR, and NOT, which correspond to conjunction, disjunction, and complement, respectively, propositions are evaluated as follows:

Conjunction			Disjunction			Complement	
A	B	A and B	A	B	A or B	A	not A
0	0	0	0	0	0	0	1
0	1	0	0	1	1	1	0
1	0	0	1	0	1		
1	1	1	1	1	1		

Source: authors' design, based on Mathworks (2009)

Figure 4 – Ordinary Logical Operators

As mentioned before, ordinary sets can be regarded as a particular case of fuzzy sets, in which degrees of membership are restricted to two extreme alternatives (0 or 1). Due to this fact the choice of the fuzzy logical operators should be able to preserve the ordinary logical operators for bivariate memberships – as in Figure 4 – and be capable of evaluating

multivariate degrees of membership. This is conveniently attained by using min(.) instead of AND for conjunction, max(.) instead of OR for disjunction, and 1-(.) instead of NOT for complement.[7]

The existence of these fuzzy logical operators allows developing and evaluating fuzzy inference rules, which are rules for deriving truths from stated or proven truths [McNeill and Thro (1994)]. The set of fuzzy inference rules or knowledge base which contains general knowledge pertaining to a problem domain, connects antecedents with consequences, premises with conclusions, or conditions with actions [Klir and Yuan (1995)]. If A and B are fuzzy sets, the simplest form of a fuzzy inference rule is the following:

if A, then B

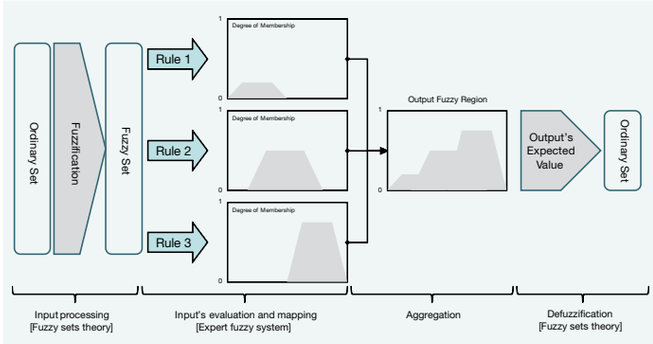
Other more elaborate rules may look like the following:

if A is […] **AND** B is […] **OR** C is […], then D is […]

Inference rules result from expert knowledge and try to imitate human's reasoning capabilities. Cox (1994) claims that the process of building a knowledge base via the design of fuzzy inference rules forces experts to deconstruct their expertise into fragments of knowledge, which results in a significant benefit of fuzzy system modeling: to be able to encode knowledge directly in a form that is very close to the way experts themselves think about the decision process.[8]

As stressed by Sivanandam et al. (2007), the Achilles' heel of a fuzzy system is its rules; smart rules give smart systems and other rules give less smart or even dumb systems. Bojadziev and Bojadziev (2007) emphasize the important role played by the experience and knowledge of human experts when developing the knowledge base because they are appointed to state the objective of the system to be controlled. The evaluation of the inference rules is carried out by a fuzzy inference processing engine, which is based on the fuzzy logical operators previously introduced. The fuzzy inference processing engine is in charge of evaluating input's degree of membership to the fuzzy output sets according to all the inference rules, where such evaluation is done simultaneously.[9]

Each time the fuzzy inference processing engine evaluates an input's degree of membership to the inference rules, it maps each solution variable into its corresponding output fuzzy set, where the resulting number of output fuzzy sets matches the number of inference rules used to evaluate the inputs. For example, as in the left part of Figure 5, evaluating and mapping an input with three inference rules would result in three output fuzzy sets. The aggregation of these three fuzzy sets produces the final output fuzzy region, which contains the information of the degree of membership (or truth) of the inputs (or propositions) after the simultaneous evaluation



Source: authors' design

Figure 5 – The fuzzy logic inference system

of the inference rules. Afterwards, since a single and crisp quantity is required, the best representative value of the output fuzzy region has to be calculated; because of the conversion of fuzzy into ordinary quantities, this process is known as defuzzification, and corresponds to the calculation of the expected value of the output [Cox (1994)].

According to the literature [Sivanandam et al. (2007), Klir and Yuan (1995), Cox (1994)], there exist several defuzzification methodologies:

- **Centroid –** this is the most widely used method, also known as the center of gravity method or center of area method. It is calculated as the weighted average of the output fuzzy region and corresponds to the point in the x-axis which divides the output fuzzy region into two equal subareas.
- **Max-membership-principle –** also known as height method or maximum height method, finds the domain point with the maximum truth, which corresponds to the x-axis point where the maximum height with respect to the origin is found. If the solution is not unique, the point is located in the center of the solution range; when this conflict resolution approach is used the method is regularly known as mean-max-membership-principle.
- **Weighted average method –** the maximum truth (height) of each output fuzzy set is used to calculate the weighted average of maximum truth.

7 Some alternatives do exist for the min(.) and max(.) functions. In the case of disjunction min(.) may be replaced by product [prod(.)] and max(.) may be replaced by the algebraic sum [probor(.)], where probor(a,b)= a + b – ab. Nevertheless, the majority of FL applications use min(.) and max(.) as disjunction and conjunction operators [Mathworks (2002), Cox (1994)].

8 Cox (1994) emphasizes that conventional expert and decision systems fail because they force experts to crisply dichotomize rules, resulting in unnecessary multiplication of rules and inability to articulate solutions to complex problems.

9 According to Cox (1994) the main difference between conventional expert systems and a fuzzy expert system is the latter's simultaneous evaluation of inference rules, which compared to the serial evaluation of the former has the advantage of being able to examine all the rules and their impact in the output space.

- **Center of sums –** is similar to the weighted average method, but the areas of each output fuzzy set are used as weights instead of using the truths (heights).
- **Center of largest area –** the centroid of the largest output fuzzy set area is used as the expected value of the output.

According to Sivanandam et al (2007), Klir and Yuan (1995), and Cox (1994) the most used method is the centroid. Cox (1994) highlights centroid's consistency and well-balanced approach, its sensitiveness to the height and width of the total fuzzy region[10], and the smooth changes in the expected value of the output across observations. Cox also emphasizes that unless there are reasons to believe that the model requires a more advanced or specialized method of defuzzification, the model should be limited to either the centroid or the max-membership-principle method.

Finally, according to McNeill and Thro (1994), the combination of fuzzy inference rules and the fuzzy inference processing engine – based on fuzzy logical operators – results in an expert fuzzy system. Jointly, as in Figure 5, the use of an expert fuzzy system and fuzzy sets theory results in a fuzzy logic inference system (FLIS).

A fuzzy logic inference system (FLIS) for operational risk (OR)

OR is a good candidate for a FLIS-based solution. Inputs to be captured include qualitative and quantitative information, where the former comes mainly from expert knowledge and the latter is rather incomplete and scarce. Additionally, the solution space is highly multidimensional and non-linear, where expert-human knowledge has a lot to offer in terms of articulating solutions to complex problems, and where traditional quantitative approaches alone are fated to fail.

Several authors [Austrian Nationalbank (2006), Elkins (2004), Shah (2003), Causal Actuarial Society (2003), Hoffman (2002), Cruz (2002), Scandizzo (2000)] have highlighted some of the aforesaid potential benefits of using FL-based approaches to measure OR. Nevertheless, just a few [Elkins (2004), Shah (2003)] have developed a formal, yet practical, OR model, which is the primary objective of this section. Furthermore, because a FLIS-based solution is capable of evaluating updated qualitative and quantitative OR factors, and their interactions through the imitation of human's reasoning capabilities, it is possible to obtain an updated and comprehensive expected OR figure. Most notably, this possibility allows the risk management process to evaluate mitigation efforts ex-ante, avoiding to some extent the aforementioned system complexity build-up and optimizing risk management resources.

The herein proposed OR model can be described as a FLIS model based on the self-assessment of key rate indicators (KRIs) within a bottom-up approach. In the next sections this broad description will become clear as we address the two first stages of risk management: identification and assessment. Monitoring and mitigation stages are addressed after the model's results are presented.

Identification

The identification process begins by defining the appropriate approach for managing OR. Two alternative approaches are commonly used: top-down and bottom-up.

The first alternative, a top-down approach, focuses on OR's identification through the combination of an external or internal database of loss events and traditional risk discovery techniques such as workshops, checklists, or questionnaires, where identified risks are aggregated into risk categories consistent with the organization's definition of risk. Top-down approaches do not focus on the identification of sources or causes of risk, but on the identification of direct or indirect losses that have affected or may affect the firm as a whole, where the identification process is usually centralized within the organization [Gallati (2003)]. Differently, the bottom-up approach, instead of relying on effective or potential losses (symptoms), focuses primarily on the identification of the potential sources or causes of OR within the organization [Gallati (2003)]. Under this approach the identification process requires the organization's breakdown into its core processes, which in turn may be broken down into sub-processes and tasks, followed by mapping risk exposures and the potential downside events that could result in the inability to meet the firm's objectives; the risk exposure analysis includes understanding the risk factors that generate OR (human resources, technology, processes, external events, etc.) and recognizing their interrelations and their typically non-linear cause-and-effect relationship.

Regarding OR quantitative assessment, a top-down approach consists of calculating a loss figure at the firm level and then attempting to allocate it down to the firm's businesses, often using a proxy such as expenses or a scorecard approach. Under a bottom-up approach OR quantitative assessment consists of the analysis of loss events in individual business processes and the identification and quantification of each type of risk at that level [Haubenstock and Hardin (2003)].

Even though both approaches may use qualitative information, the bottom-up approach will benefit more from it. Under the bottom-up approach the expert knowledge is used to understand the linkages between OR factors and their effects, thus providing valuable information for monitoring and mitigation stages. The use of qualitative information under a

10 Regarding centroid's sensitiveness, Cox (1994) affirms that it behaves in a manner similar to Bayesian estimates, that is, it selects a value that is supported by the knowledge accumulated from each executed proposition.

top-down approach mainly consists of an overall impression of the OR at the firm level [Gallati (2003)].

The choice between a bottom-up and a top-down approach within the proposed model mainly follows the dominance of the first in terms of its ability to map risks and make use of and profit from qualitative inputs at a conveniently disaggregated level. This will allow a more comprehensive and constructive identification, assessment, monitoring, and mitigation of OR. As Scandizzo (2005) argues, because OR is not product specific, risk mapping is the basis for OR management.

Consequently, the identification stage will consist of the firm's breakdown into its core processes, which in turn may be broken down into sub-processes and tasks. As Haubenstock (2003) asserts, the result of this stage is a risk map detailing which of these risks applies to any one business, process, or organizational unit and to what degree, where degree is often defined as frequency and severity, they are rated either qualitatively (high, medium, low) or on a quantitative scale.

The number of levels the firm is broken down into will depend on characteristics such as size, complexity of its processes, and the employees' background. The authors' experience in the implementation of the proposed model within the International and Monetary Affairs Division of Colombia's Central Bank signals the benefits of a detailed breakdown. The possibility of reaching the expertise of the incumbent or "owner" of each one of the tasks which compose the processes and sub-processes results in an extraordinarily practical view of the interaction and consequences of OR causes. In many occasions the incumbent of the task was able to identify, describe, and analyze OR sources and linkages which were not apparent to the managerial staff.

According to Blunden (2003), the identification of a risk's incumbent or "owner" is needed in order to ensure that a specific person (or committee) takes responsibility for the risk and therefore for its management and mitigation, not to generate a blame culture. Without such responsibility approach for risk ownership there will be many fewer risks identified and much less enthusiasm on the part of management and supervisors to be conscious of the risks faced by an organization.

Even though a high-detail decomposition of the firm's processes may help identify and analyze a broader base of OR sources and their connections, two main issues need to be considered. First, if the firm is too large the implementation of a risk management program may become burdensome. However, even if the majority of the firm's operational risk does not result from a few critical processes, this issue may be partially surmounted through a decentralized implementation of the model within the firm. Second, depending on the employees' background, the qualitative inputs may become particularly biased. Consequently, a careful design of the management process (i.e., a "no blame" culture) is necessary to avoid subjective bias [Alexander (2003)]. Again, the risk manager should find an optimal level of detail for the firm's sources of risk according to its inherent characteristics.

Assessment

Assessment provides the organization with an objective process by which to determine what the exposures are, how well the organization is controlling and monitoring them, what the potential weaknesses are, what the organization should be doing to improve, who is responsible for these actions, and how the organization plans to accomplish them [Haubenstock (2003)]. OR assessment under this model relies on a FLIS. As presented before, the design of the FLIS consists of several elements, which will serve the purpose of capturing and interpreting quantitative and qualitative factors in order to ultimately deduce an expected OR figure. Hence, before applying the FLIS model, the elements of a FLIS should be properly defined.

1. Inputs and fuzzification procedure

Risk mapping may be described as a systematic way of extracting task-specific information on the various ways a process can fail [Scandizzo (2005)]. The most simple and common risk mapping technique consists of constructing a probability/severity chart where risk management priorities may be easily identified, but where information for specific management actions is absent. A more complete way is to map the risks to the phases of a business activity and identify the task-specific key risk factors and drivers in the process; this leads to a more complex result, where priorities and information for management's specific actions are provided, but where standardization across different firms, processes, or even tasks is rather troublesome.

The herein proposed mapping technique is an intermediate one, where the trade-off between standardization and comprehensiveness is most favorable and constructive for an effective risk management program. Instead of identifying heterogeneous task-specific key risk factors or constructing a plain probability/severity chart, the model relies on task-generic key risk factors, capable of reasonably signaling priorities and

Class	Description
Descriptive	Variables related to the expected impact of an OR event; they exhibit a low ability to predict its occurrence.
Performance	Variables related to the probability of an OR event happening; they exhibit a low ability to address the impact of an OR event.
Control	Variables related to managerial actions or decisions. Management can predict their evolution and can use them as indicators of how the control environment will be in the immediate future.

Source: authors' design, based on Scandizzo (2005).

Figure 6 – KRIs' Classification

KRI	Class	Description	Source – type
Impact of task's failure on the process (IoP)	**Descriptive**	Expected impact at the process level of an OR event happening in a specific task.	Expert knowledge from the task's incumbent and backup – Qualitative input.
Impact of process' failure on the firm (IoF)		Expected impact at the firm's business level of an OR event happening in a specific process.	Expert knowledge from the process' manager – Qualitative input.
Expertise (E)	**Control**	Perceived proficiency of the employee for developing a specific task. It comprises the human resources training and knowledge level.	Expert knowledge from the task's incumbent and backup – Qualitative input.
Probability (P)	**Control / performance**	Expected likelihood of an OR event happening in a specific task. It comprises the efficiency of controls in place.[11]	Expert knowledge from the task's incumbent and backup – Qualitative input.
Feedback (F)	**Performance**	Effective OR data is contrasted against expected OR in order to constantly validate the model and recognize eventual environment shifts. It issues warning signals as reality overtakes expectations.	OR event collection – Quantitative input.

Source: authors' design

Figure 7 – Selected KRIs

strategies for risk management purposes. The aforementioned task-generic key risk factors will be those variables, either quantitative or qualitative, which together will serve the purpose of estimating the probability and severity of OR events at the task level. Those risk factors are commonly known as "key risk indicators" (KRIs) and can be classified as descriptive, performance, or control indicators.

The definition of the KRIs should observe five convenient features:

- **Relevancy –** variables should effectively capture a specific KRI class.
- **Generality –** variables can be used across firms, processes, or tasks.
- **Non-redundancy –** avoid correlated KRIs.
- **Measurability –** variables should be quantifiable and verifiable.
- **Monitoring facility –** cost and simplicity of monitoring.

According to these features, the proposed KRIs are i) impact of task's failure on the process; ii) impact of process' failure on the firm's objectives; iii) expertise; iv) probability, and v) feedback. Figure 7 describes and classifies the proposed KRIs.

Some important remarks about the selected KRIs, their characteristics, and the proposed capture method are now addressed:

- Each task requires the evaluation of the mentioned KRIs, which means that each task has its own OR assessment. In order to obtain the sub-process, process, or firm level OR figure, an aggregation method should be defined. Our suggestion is to equally weight each task, sub-process, or process within the firm. This choice recognizes that impact related KRIs already represent a weighting scheme. The aggregation of the OR allows achieving a firm level figure, which can be easily decomposed for OR prioritizing purposes, as will be described when the mitigation stage is addressed.
- Besides capturing the qualitative information from the task's incumbent, the appointed backup employee is also required to separately provide his qualitative information. Both employees' qualifications are weighted by their expertise level to obtain the weighted expected OR Indicator. This is of key importance for the model since it is most probable that OR will increase as the backup is temporarily in charge of the incumbent's duties. Thus, when the incumbent is absent from the office the backup information is the sole source of KRIs.
- Besides capturing the information for a normal state-of-the-nature scenario, the incumbent and the backup are required to gather and give their qualitative information about what a contingency state (earthquake, collapse of communications, etc.) would imply for the probability (P) KRI. This is of key importance for the model since it allows identifying tasks, sub-processes, and processes which are more sensitive to extreme events happening.
- The feedback (F) KRI is a particular input, which will result from the OR event collection. Depending on the task the feedback is captured manually (i.e., in a spreadsheet) or in real-time (i.e., an automatic electronic error report from a transactional platform).[12] Feedback is a quantitative input that serves the purpose of contrasting the expected OR events with effective OR events. If effective OR events surpass the expectancy, the model internally adjusts – increases – the expected OR in order to recognize an eventual environment shift or a injudicious KRI evaluation. At the same time a warning signal is issued to inform the risk manager of the incident.
- To separately capture the impact of a task's failure on the process and the impact of process' failure on the firm's objectives allows discrimination between OR events that could seriously endanger firm's business goals and those that may be important at the process level, but have moderate or negligible effects for the firm. To guarantee

11 The proposed model deals directly with the risk remaining after all – formal and informal – controls are considered (residual risk). The authors found that questioning employees or managers about the probability of an OR event happening without controls (inherent risk) resulted in awkward and ultimately unhelpful answers.

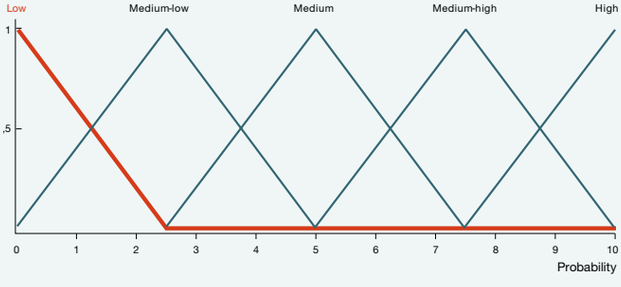
12 Feedback's capture is a rather difficult chore. For automated tasks it may require some technological developments; for non-automated tasks, where an employee is in charge of the event's report and documentation, feedback's capture may be troublesome.

a sound judgment on the impact of a process' failure on the firm's business goals a strategic view of the firm is required. Consequently, senior level executives should be appointed to provide this KRI.

- In order to capture the inputs, the incumbent and the backup use a Matlab®-based GUI (graphic user interface) which requires a non-scaled qualitative assessment of the corresponding KRIs for each of his tasks (IoP, P, E). The manager of each process also uses a GUI for his qualitative assessment of IoF. This means that the model relies on self-assessment. Haubenstock (2003) asserts that self-assessment helps to unveil and discuss risk across the organization and discuss interdependencies, but highlights that independent involvement plays a key role in coordinating, reviewing, discussing, and challenging the results in order to ensure that everyone is responding in a consistent fashion. Our experience corroborates Haubenstock's assertions. It is crucial to have staff that ensure consistency in the assessment procedure, and are capable of fully understanding the FLIS and of analyzing the responses in order to keep the process and results objective. Additionally, we found that training and accompanying incumbents, backups, and managers is essential to facilitate and enhance the procedure.

Subsequently, in order to capture KRIs and to be able to translate them into quantitative variables, the fuzzification procedure should be defined. The foundation of this procedure is the design of the fuzzy sets and the membership functions. The fuzzy sets theory will make it possible to obtain the imprecise and vague, yet valuable and irreplaceable, judgment of the people associated with the tasks and processes to be evaluated. It would be clumsy and imprecise to ask for true or false, yes or no, 1 or 0 answers when dealing with variables such as expertise, impact, or probability.

In order to translate the judgment of the people into a quantitative variable, the corresponding membership functions should be defined. Our choice is to employ the most used and practical membership function: triangular [Bojadziev and Bojadziev (2007); McNeill and Thro (1994)]. Figure 8 presents our probability (P) input as a mixture of triangular membership functions.



Source: authors' design

Figure 8 – Probability KRI as a fuzzy variable

2. Outputs

The expected OR figure may be of two types: expected operational loss or expected operational indicator. The choice will depend on the objectives of the OR management model. If the model is intended to solely calculate capital requirements due to OR, then the expected OR figure should inevitably be a dollar-loss; if the model is intended to serve as a tool for OR management, it may yield a loss or an indicator. The choice of expected OR figure type will define the nature of the output fuzzy set. If the expected OR figure is in the form of an index OR Indicator, the risk manager should fit linguistic variables such as high, medium, and low to a subjective output scale (i.e., 0 to 10, 1 to 100, etc.) through the design of appropriate membership functions; in this way the risk manager will use the model's output as a relative indicator of the expected OR.

If the expected OR figure is monetary the risk manager will define a scale which reveals his expert judgment of how to qualify a monetary loss. According to Shah (2003), since inference rules cover all possible combinations of KRI levels, an estimated loss amount can be calculated for the current levels of each KRI, resulting in a expected OR dollar-loss; in this case, instead of defining a subjective indicator scale, the risk manager should fit an OR dollar-loss scale, which may result from an empirical distribution based on – internal or external – historical losses or other quantitative methods such as "extreme value theory."

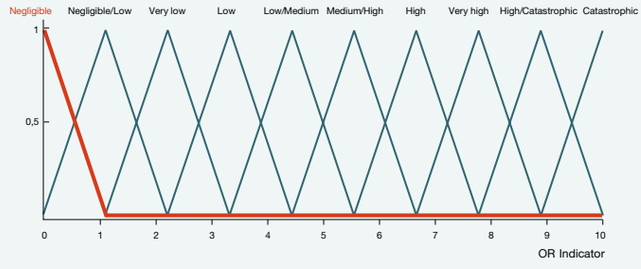
As stated by Sevet (2008), because central banks' OR relate to the potential failure to achieve predefined legal or statutory obligations, their approach to the OR management has to remain predominantly qualitative.[13] Since the proposed model was built for the Foreign Reserves Department and the Operations and Market Development Department of Colombia's Central Bank, an organization not compelled to calculate OR capital requirements, the choice is to employ an OR Indicator as output. Consequently, our choice is to use a 0 to 10 OR indicator which employs a mixture of the most used and practical membership function: triangular. Figure 9 presents our output set.

As already mentioned, a risk manager interested in a monetary OR figure could fit an estimated loss amount instead of an OR indicator. In this case traditional quantitative approaches could help the risk manager to define the most appropriate dollar-loss scale.

3. Knowledge base

The set of inference rules or knowledge base have the objective of deconstructing expert's knowledge and encoding it in a form that the FLIS is capable of mimicking human's reasoning capabilities to solve complex

13 On the other hand, because all private sector risk-generating events materialize in a financial VaR, their OR management can and indeed must be based on a quantitative approach and justify monetary incentives at company and individual levels [Sevet (2008)].



Source: authors' design

Figure 9 – OR indicator as a fuzzy variable

systems. Consequently, an expert (or group of experts) analyzes the KRIs, their different linkages, and their relation to the linguistic variables in the output space, resulting in a list or set of educated inference rules that will solve simultaneously any combination of inputs and calculate the expected OR Indicator. Our knowledge base consists of approximately 180 inference rules. The literature does not mention a method for establishing the optimal number of inference rules, but to achieve an intuitive, smooth, and continuous solution space for every combination of KRIs is a fair rule of thumb adopted by the authors.

4. Defuzzification

Having specified the input space, the output space, and the knowledge base, the method for estimating the expected OR Indicator is to be defined. Cox (1994) highlights centroid's consistency and well-balanced approach, its sensitiveness to the height and width of the total fuzzy region and the smooth changes in the expected value of the output across observations. Additionally, Cox affirms that it behaves in a manner similar to Bayesian estimates, that is, it selects a value that is supported by the knowledge accumulated from each executed proposition. Taking into account these advantages and because it is the most used method [Sivanandam et al. (2007), Klir and Yuan (1995), Cox (1994)], centroid or center of gravity method is the authors' choice.

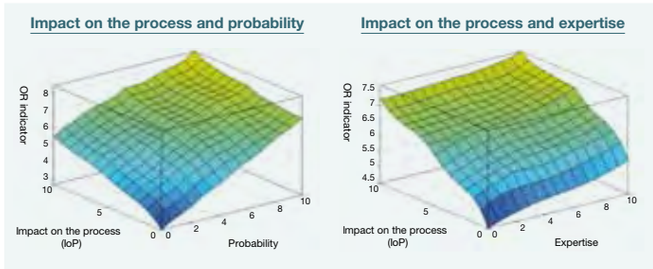
Results

Based on the set of inference rules, the FLIS is capable of inferring all the attainable OR indicator results for any KRIs combination. These results are best presented as a surface plot. The next figure exhibits the OR indicator as a combination of impact on the process and probability (left) and of impact on the process and expertise; remaining KRIs are held constant.

Figure 10, somewhat similar to a probability/severity chart, displays the non-linear relation between impact on the process, probability, or expertise and the OR indicator, where each combination of these KRIs results in a unique position on the surface. Intuitively, if an event happening within a task has a low (high) impact on the process and a low (high) probability, the OR indicator yields a low (high) outcome, where intermediate results are also considered according to the knowledge base.

Comparing Figure 10's left and right surfaces helps to distinguish the different effects of changes along probability and expertise on the OR indicator according to the expert's knowledge. Because the slope of the OR indicator with respect to probability is greater than the slope with respect to expertise – holding all other KRIs constant – it could be asserted that the experts that designed the knowledge base recognize that it is more efficient to focus on reducing the likelihood of an event happening (i.e., better controls) than increasing training. Ultimately the FLIS will take each KRI level and evaluate them simultaneously in order to infer their joint correspondence to the OR indicator. This is akin to constructing a six-dimensional space where the KRIs' levels results in the OR indicator, a rather complex procedure. This way the model is capable of modeling the non-linearity and complexity of OR assessment, while remaining intuitive and practical.

Although measuring OR is the goal of the FLIS model, it is not an end in itself. The OR indicator's importance comes from its monitoring and mitigation capabilities, which are related to its use as a trend indicator and as a tool for ex-ante evaluating the effects of risk management decisions, correspondingly. Monitoring is based on the evolution of the OR Indicator, which helps analyzing the dynamics of the OR over time. The OR indicator's evolution is due to changes in self-assessed KRIs and the Feedback KRI. Concerning the first, OR indicator evolves each time a related KRI is evaluated by the incumbent, backup, or manager. About the latter, the feedback is continuously updating the expected OR indicator as new OR events arrive. Moreover, because the OR indicator for each process, sub-process, and task can be easily broken down to the underlying KRIs, this model allows monitoring not only at an aggregated level, but at KRI level. This fact provides the risk manager with the possibility of identifying the primary source of any aggregated OR indicator change. This ensures that the monitoring stage, which is devoted to understanding the current risk profile, its changes, and its priorities [Haubenstock (2003)], is properly fulfilled.



Source: authors' calculations

Figure 10 – OR Indicator as combinations of selected KRIs

Mitigation refers to the actions the risk manager undertakes in order to reduce the expected OR. Those actions should effectively tackle the causes of OR (inadequate or failed internal process, people and systems, or from external events, among others), where the chosen KRIs have valuable information for the risk manager to prioritize the resources devoted to those actions. As mentioned previously, because the OR indicator for each process, sub-process, and task can be easily broken down to the underlying KRIs, this model allows prioritizing risk management actions at the KRI level. For example, if the OR indicator is disaggregated to the KRI level, and the most adverse KRI is a low expertise level, the risk manager is able to focus his efforts and resources to instruct the corresponding incumbents and backups.

Finally, because the model allows evaluating the expected change in the OR indicator caused by the implementation of an eventual mitigation action, it is possible to estimate the resulting expected OR, which also helps optimizing risk management resources.

Final remarks

OR factors are more diverse, complex, and context-dependent than those typical of MR and CR. Consequently, as presented in this paper, OR assessment requires models that are not only reliant on traditional quantitative approaches. The use of a FLIS is an alternative worth implementing, since it allows for exploiting human reasoning and expert knowledge to articulate qualitative and quantitative inputs when solving the multifactor and highly non-linear system which underlies OR.

Besides the ability of a FLIS to overcome some of the assessment difficulties faced by traditional quantitative approaches, it allows articulating OR measurement with the other stages of OR management. Whilst quantitative approaches rely on a broad approximation to OR assessment, where the risk sources are not clearly identified and mitigation efforts cannot be evaluated, the proposed model allows not only assessing, but also identifying and monitoring OR's sources, and evaluating risk management decisions ex-ante. This results in two advantages: first, the proposed model preserves the true preventive nature of risk management, where measurement is not an end in itself; second, to be able to evaluate mitigation efforts ex-ante avoids concealed OR sources from system complexity build-up and optimizes risk management resources.

An additional source of improvement is the model's ability to contrast effective with expected OR data, which makes it possible to constantly validate its outcome, recognizing environment shifts, and issuing warning signals. Nevertheless, such ability depends on a feedback factor which is not easily captured due to the differences between tasks within an organization and technical issues.

Our experience with implementing the herein presented model resulted in three main practical issues. First, despite the documented literature on the advantages of non-quantitative approaches to OR, managerial staff tends to underestimate such approaches, which results in some resistance to its implementation. Managers are acquainted with quantitative methods and prefer their objectivity and independence from experts' views or knowledge. This issue may be surmounted with proper instruction about the model and about the advantages of other models which deal with experts' views (i.e., Black-Litterman portfolio model).

Second, since it relies on self-assessment, the model depends on the quality and frequency of the information provided by the incumbent, back-up, and managerial staff. In order to ensure high-quality data the model's implementation should be accompanied by training and support from the risk management officer, who should be able to analyze the results and identify problems related with criteria homogeneity and the eventual existence of a "blame culture," among others.

Third, as discussed in the literature, the quality of the knowledge base is the mainstay of the model's value. The process of decomposing experts' knowledge into inference rules is time consuming and requires a thorough understanding of the sources of risks, tasks, and processes, along with their non-linear and complex interrelation.

Finally, based on what we have documented we recommend taking a comprehensive view of risk management, where OR assessment is only a part of the process. Quantitative approaches, which typically deal with the intricate estimation of losses and their probabilities, are only a part of the convoluted process of OR management. The FLIS herein proposed complements such customary approaches in a practical, intuitive, and sound manner. Despite not being the only expert knowledge based alternative, our practical experience confirms that the opportunity of undertaking a conveniently detailed bottom-up approach, along with the possibility of evaluating mitigation efforts ex-ante and validating its outcome, makes this alternative worthwhile.

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PART 2

Bringing Islamic Banking into the Mainstream is not an Alternative to Conventional Finance

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Abstract

The latest economic crisis shook the previously firm belief in the prosperity-bringing financial sector around the globe. For many months after the catalytic bankruptcy of Lehman Brothers, the economy was in apparent freefall. News about plunging equity, housing, and commodity markets, dried out inter-bank lending, nose-diving industrial production and trade, and rising unemployment have characterized our daily routine. But between all this doom and gloom some parts of the deeply shaken financial sector attempted to promote themselves as bearers of hope for a new, improved, and more stable financial system. Economists, politicians, and clergymen alike increased their efforts during the financial crisis to make the mainstream aware of the advantages of Islamic finance. Islamic financial assets today are believed to barely exceed U.S.$1 trillion, but have been observed to grow in the two-digit area over the last decade [Economist (2008)]. Hence, Islamic finance has its foot in the door of the financial mainstream. The mentioned economists, politicians, and clergymen are helping with the last push to open this door. But what will happen once Islamic finance tumbles into the mainstream? Will we enter an era of new, religion-like belief in stable and prosperity-bringing finance? The announcement in late 2009 by Dubai World, the emirate's flagship for investment in the region, that it was not able to repay an Islamic bond in time cast fresh doubts on Islamic finance's claim of inherent stability. This article argues that Islamic finance is not a stable alternative, since Islamic banking in particular and Islamic finance in general do not differ significantly from conventional banking and finance. In the following the reasons for the alleged superiority of Islamic finance will be explored, namely its developmental character, the inherent stability, and the importance it assigns to individuals' morality. Being based on Islamic economics, Islamic finance simply replaces the religion-like belief in the neoclassical dogma of the efficient market with the religiously motivated belief in the morality of the homo Islamicus. The outcome is strikingly similar.

The latest economic crisis shook the previously firm belief in the prosperity-bringing financial sector around the globe. While investment banks like Lehman Brothers could pick among the brightest and best performing university graduates swamping their doors, in the post-Lehman world, laid-off bankers and traders knock at the doors of universities trying to bridge their unemployment, exploring the reasons for financial instability. For many months after the catalytic bankruptcy of Lehman Brothers, the economy was in apparent freefall. News about plunging equity, housing, and commodity markets, dried out inter-bank lending, nose-diving industrial production and trade, and rising unemployment have characterized our daily routine. But between all this doom and gloom some parts of the deeply shaken financial sector attempted to promote themselves as bearers of hope for a new, improved, and more stable financial system. Economists, politicians, and clergymen alike increased their efforts during the financial crisis to make the mainstream aware of the advantages of Islamic finance.

Politicians like Malaysia's Prime Minister Ahmad Badawi declared Islamic finance a stable alternative, attempting to establish their country as a global Islamic finance center. Western economists such as Presley and Ferro together with Islamic ones like Chapra and Saddiqi pointed toward the developmental nature of Islamic finance [Dar and John (1999), Ferro (2005), Chapra (2000), Siddiqi (1983, 2000)]. Clergymen – most recently the Pope – joined in praising its ethical character [Wigglesworth (2009)].

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The announcement in late 2009 by Dubai World, the emirate's flagship for investment in the region, that it was not able to repay an Islamic bond in time cast fresh doubts on Islamic finance's claim of inherent stability. This article argues that Islamic finance is not a stable alternative, since Islamic banking in particular and Islamic finance in general do not differ significantly from conventional banking and finance. Islamic banking being the oldest and most visible element of Islamic finance is to some extent understood as pars pro toto – i.e., representative for the Islamic finance industry as a whole. In the following, the reasons for the alleged superiority of Islamic finance will be explored, namely its developmental character, the inherent stability and, the importance it assigns to individuals' morality.

Being based on Islamic economics, Islamic finance simply replaces the religion-like belief in the neoclassical dogma of the efficient market with the religiously motivated belief in the morality of the homo Islamicus. The outcome is strikingly similar.

Why is Islamic banking superior to conventional banking?

1. … because Islamic finance is more developmental than conventional finance

Islamic economics emphasizes the need for the economic and financial system to promote social welfare. Economic stability is one of the goals of Islamic economics and concurrently its means to generate welfare since stability is regarded as conducive to growth and development [Chapra (2000)]. The claim of a developmental character to Islamic finance is often backed with empirical observations from microfinance institutions [Ferro (2005)]. One of the biggest and most well-known amongst these institutions, Grameen Bank, is based in Bangladesh and therefore caters to a Muslim clientele. Islamic lending is often perceived to be character-based just like micro loans [Dhumale and Sapcanin (2004)], which frequently depend on tightly knit local community structures for enforcement.

Additionally, standard economic theory can be drawn upon to show that Islamic banking achieves a Pareto-optimal credit allocation while conventional finance in comparison fails to do so. In other words, the credit allocation under an Islamic contract improves the situation for at least one participant (creditor or borrower) in comparison to conventional lending, without worsening it for anyone else. Arguably, under an Islamic lending regime more credit would be available.

Mainstream (Western) economic models assume that lender and borrower possess conflicting interests. This is the reason why interest payments and collateral requirements are in place. This conflict is increasing with the amount of credit granted. While the lender has an interest in maximizing the investment effort and a full payback of his loan with interest, the borrower is believed to have an incentive in shirking and at the extreme in disappearing with the lent amount. The situation can be further complicated through informational asymmetries; i.e., lenders are uninformed about borrowers' usage of the borrowed money. This conflict of interest is precisely the reason for a premium on external finance. In a perfect world,[1] the cost of external finance would be equal to the cost of internal finance,[2] meaning that it would not make a difference whether firms' investment is financed by credit or by retained profits. Consequently, according to economic theory a loan which merely amounts to the borrower's net worth (W), in other words to the net worth of his collateral, should be extended at the risk-free interest rate ρ. Interest on loans beyond the

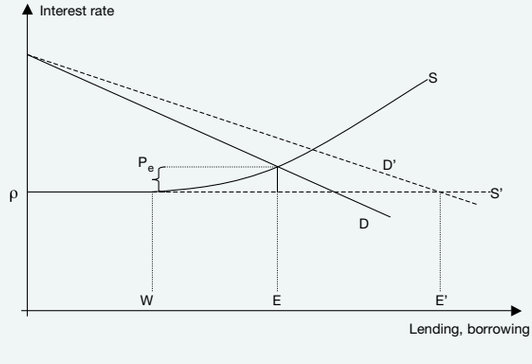
1 This is obviously the Arrow-Debreu world, where all agents possess perfect information about the past, present, and the future.

2 This is, in a nutshell, the content of the Modigliani-Miller theorem.

borrower's net worth will rise with the increase in the sum credited (Figure 1). One of the most prominent features of Islamic banking is the prohibition of interest payments and collateral requirements.

Islamic scholars believe that individuals that share the same values will not behave like the "homo economicus" in the imperfect information scenario. The "homo economicus" takes the money and runs while the "homo Islamicus" perceives this as immoral. Also, the "homo Islamicus" regards charging or receiving interest as immoral. Islamic credit contracts should, therefore, be fundamentally structured like joint venture agreements – namely profit-and-loss sharing (PLS) agreements – with varying voting and co-determination rights [Chapra (2000)]. This last proposition tries to establish the Pareto-optimal result, where borrowing and lending is undertaken at the risk-free interest rate without an external financing premium (E' in Figure 1). Theoretically, Islamic credit should be cheaper and extended to a wider range of clients because of the fact that neither interest is charged nor collateral demanded.

In practice the vast majority of Islamic loan contracts across a wide range of countries seem to use very debt-like instruments, namely mark-up pricing [Aggarwal and Yousef (1996), Chong and Liu (2009)]. Here, it is not outright interest that is charged but a fixed mark-up. Taking Malaysia as example, it can be shown that hardly any loans are given on the basis of profit-and-loss sharing which entails a joint venture-like agreement (Table 1). Furthermore, in Malaysia floating mark-ups have been allowed for Islamic mortgages since 2004 in order to make Islamic banking more competitive vis-à-vis conventional banking [Endut and Hua (2009)]. Floating mark-ups are effectively interest rates since they adapt to the central bank's policy rate. This means the borrower cannot be certain about the amount he has to pay back for the principle sum he borrowed



Source: Gertler et al. (1994).
In a perfect world, credit extension would amount to E', catering to demand (D') at the risk-free interest rate ρ. However, since external finance is subject to a misalignment in interest between borrower and lender, there is a premium (P_e) on it as compared to internal finance and credit extension shrinks to E.

Figure 1 – The Pareto-optimality of Islamic lending

Year	2001	2002	2003	2004	2005
Primary modes of finance (Mudharabah & Musyarakah)	1.40%	0.70%	0.50%	0.50%	0.30%
Debt-like financing odes (Bai' Bithaman Ajil, Ijarah, Ijarah Thumma Al-Bai', Istisna', Murabahah, and other Islamic concepts)	98.60%	99.30%	99.50%	99.50%	99.70%

Source: BNM, Annual Reports, 2001-2005

Table 1 – Types of lending contract in Malaysian Islamic banking

initially. Establishing this kind of certainty is the main rationale behind the prohibition of interest in Islamic banking. The Malaysian example cannot be disregarded arguing that it is the exception rather than the rule. The country constitutes the biggest Islamic banking market in the world [World Bank (2006)]. But more importantly, it possesses a dual banking sector – where conventional and Islamic finance interact – and, therefore, serves as paradigm for the future development of Islamic finance once it enters mainstream finance internationally [Karwowski (2009)].

Two-thirds of all Islamic credit in Malaysia is consumption credit [BNM (2007)]. Since this kind of credit is used to purchase goods which only go over into the possession of the borrower once the full credit amount is paid off, effectively there is collateral involved. Hence, from a pragmatic point of view Islamic banking does use the two instruments, which it claims to forbid, namely interest and collateral. Consequently, it is doubtful whether Islamic banking is a Pareto-optimal allocation of credit increasing the credit volume relative to conventional banking.

2. … because Islamic finance is more stable than conventional finance

Islamic scholars believe that the Islamic financial system is inherently more stable than the conventional one. This claim to stability is grounded on the prohibitions and requirements formulated in the Qu'ran and the body of Islamic (written and unwritten) religious law, the sharia.

The concept of profit-and-loss sharing between Islamic banks and their customers makes Islamic banks theoretically more resilient to external shocks since losses can be passed on to depositors to some extent. This would enable Islamic banks to engage in more long-term lending with higher risk-return profiles typical for growth promoting investments such as infrastructure. However, as pointed out previously, in practice PLS is marginalized in Islamic lending in favor of mark-up pricing which often serves for short-term consumption instead of long-term investment.

Apart from the absence of interest and collateral in credit agreements, Islamic finance prohibits speculation (gharar), which is maybe most apparently linked to financial stability. This prohibition reflects a general distrust

against transactions that are not asset-backed. However, as we are experiencing in the current crisis, financial instruments backed by assets such as residential building or company value – namely mortgage-based securities and private equity – can destabilize the entire economic system profoundly. If substantive liquidity flows into the equity market, the fact that only a limited amount of shares exists causes a sharp increase in the price of equity traded in the secondary market. Rising price in turn attracts even further inflows of liquid funds into a market on the grounds of expected further price appreciation [Toporowski (2000)]. This kind of capital market inflation increasingly gaining momentum with financial liberalization, widening profit yields, and profit opportunities of financial instruments create financial instability. A financial system that claims to be more stable than the conventional one needs to address the danger of asset price bubbles. The question is whether Islamic equity is less prone to asset price inflation.

One of the fundamental difficulties in designing mechanisms preventing asset price bubbles is the identification of a bubble. Already the predecessors of the economic discipline such as Thomas Aquinus and Adam Smith where troubled by the question of "fair" or the "right" price of a good. This article will not engage in the quest for this price. Instead, a very imperfect quantitative proxy shall be used here to assess the resilience of Islamic finance to speculation, namely the volatility of Islamic equity indices in comparison to their conventional counterparts.

The two indices that will be compared are the Dow Jones Industrial Average Index and its Islamic equivalent, the Dow Jones World Islamic Index, launched in January 1996. The Dow Jones Islamic is, of course, not the only Islamic stock price index. In fact, in the last decade, with the rapid growth of Islamic finance, the amount of Islamic stock price indices also increased dramatically. However, the two mentioned indices are used as representative indices for conventional and Islamic stock markets. Hence, if Islamic finance – here in the form of stock prices – is systematically more stable than conventional finance due to structural differences, it will be also detectable in these two indices. Islamic economic theory in fact claims that this is the case [Karwowski (2009)].

The question of whether Islamic indices underperform in comparison to non-Islamic ones is one of the more researched areas of Islamic finance. The term "Islamic index" is somewhat misleading since the attribute "Islamic" rather derives from the type of economic activity that firms included in the index undertake and not so much the index itself [Karwowski (2007)]. Simplifying, Islamic indices can be understood as a differently composed form of a conventional index since they simply exclude companies that do not operate in compliance with the body of Islamic law. Generally, there is no convincing evidence that Islamic equity neither underperforms vis-à-vis nor outperforms conventional equity systematically [Girard and Hassan (2005)].

Industry allocation

Industry	DJIM index	DJ world index
Basic materials	13.91%	8.20%
Consumer goods	8.56%	11.40%
Consumer services	6.45%	8.83%
Financials	0.26%	22.04%
Healthcare	14.74%	7.71%
Industrials	14.61%	13.65%
Oil and gas	17.36%	9.97%
Technology	15.61%	8.72%
Telecommunications	5.61%	4.66%
Utilities	2.90%	4.81%

Source: Dow Jones 2009

Table 2 – Industry allocation in the Dow Jones Islamic and the Dow Jones

The Islamic Dow Jones World index is in comparison to its conventional counterpart based considerably more on resource extracting industries. Companies dealing with basic materials make up almost 14 percent of the Islamic index while they only account for just over 8 percent in the conventional Dow Jones World. Oil and Gas companies are almost twice as strongly represented in the Islamic Dow Jones as in the conventional Dow. These industries – among others – fill the gaps arising from excluding firms dealing with alcohol, pork-related products, conventional financial services, entertainment, tobacco, and weapons and defense. This explains the lower representation of consumer goods and services, and particularly the finance industry, in Islamic indices in general and the DJIM in particular (Table 2).

The strong representation of commodity-related industries would favor a stronger performance of the DJIM starting in the early 2000s as the resource price boom developed. However, the concurrent flourishing of the financial industry, which is mostly excluded from Islamic indices, might have moderated this performance. Hence, the different compositions of these indices do not give us any conclusive indication about their stability.

Looking at the volatility of the two representative indices no substantial differences can be spotted. Their coefficients of variation are very comparable (20 percent in the case of the Islamic index and 20 percent for the conventional one), indicating that the percentage deviation from their average is approximately similar. If one accepts the intensity of fluctuations around a long-term trend as proxy for volatility, it means that there is no difference between the (in-)stability of the two. More importantly, the evolution of the two indices over time is similar (Figure 2). This means that the Islamic and the conventional index tend to react to the same

Source: Bloomberg

Figure 2 – Islamic versus conventional stock price indices

events in the market and in the same direction. In fact, the two indices are correlated with a coefficient of 0.89. A correlation coefficient of 1 indicates that two series move perfectly together while a coefficient of 0 supports the hypothesis that two series are perfectly independent from each other. Hence, the Islamic and the conventional Dow Jones index are highly correlated, moving most of the time in the same direction with the same intensity.

Overall, there is little evidence that Islamic equity indices are detectably more stable than conventional ones.

3. … because Islamic finance is based on morality

If Islamic finance in actual fact does not differ from conventional finance in the effective utilization of interest or collateral and is not detectably more stable than conventional finance, the only remaining difference is its theoretical basis.

Similar to conventional finance, Islamic finance bases its claim to bring stability and prosperity on orthodox and conventional economic theory. Western neoclassical economics nurtured the ideas that freeing up financial systems – domestically and internationally – by banning "financial repression" through deregulation would bring stability to developed countries and growth to developing ones. Deeper financial markets would help to hedge risk and provide entrepreneurial credit increasing investment leading to growth, conversion of economic welfare, and consequently development. Islamic economics echoes this claim for Islamic finance yet emphasizing morality. Given that excessive risk-taking by financial institutions was denounced as a major cause of the latest crisis, a stress on moral values and ethical behavior does not only appeal to Muslim economists or the Pope.

Sharing profit and loss between creditor and debtor is meant to align their interests, but their shared values and morality are the elements that ultimately ensure trust between the two and make collateral unnecessary. Hence, Islamic scholars claim that the fundamental difference between conventional and Islamic economics is the morality of the "homo Islamicus" in contrast to the rationality of the "homo economicus" [Chapra (2000b)]. Islamic finance and banking are meant to function based on this fundamental morality and derive their claim towards more stability from it.

In times when everyone is talking about missing trust between banks being at the heart of the crisis (showing in dried-out inter-bank lending), this argument portrays Islamic finance as an intriguing alternative to the crisis-ridden status-quo. Here again conventional economic theory can support this claim. In theory, interest-based lending and borrowing – regardless of whether between individuals or banks – happens at the risk-free interest rate r* up to the point of collaterizable wealth of the borrower, after which the charged interest rate increases the bigger the size of the loan. However, assets that constitute wealth are typically behaving pro-cyclically. In other words, during economic upswings asset prices are increasing, raising the borrower's wealth and his ability to borrow. During downswings in turn asset prices decline diminishing the borrower's collateral. Hence, most economists agree that credit cycles tend to exacerbate economic cycles [Bernanke and Gertler (1989)]. In economically turbulent times, when asset prices are in freefall – as we experienced during the recent subprime crisis – the net worth of a potential borrower might even turn negative. Frozen inter-bank money markets can be modeled similarly. The suspicion that other banks might hold worthless assets – i.e., bad debt – decreases banks' willingness to lend among themselves, which manifests itself in extraordinarily high cost of borrowing. This is equivalent to a collapse in borrower's net worth and a failure of demand and supply curves to intersect. Economists such as Joseph Stiglitz like to refer to a loss of trust characterizing this kind of situation [Stiglitz (2009)].

From a theoretical perspective, Islamic loans, which do not require collateral, seem like a viable alternative. The fall of collateral value would not take place and would not have the dramatically limiting effect on lending between banks as in the case just described. Furthermore, the trust existing between banks could theoretically ensure the upkeeping of inter-bank lending.

The problem with arguments based on trust is that they are a dead end for logical reasoning. What determines trust? And why should lending be so much dependent on trust? I do not trust my bank assuming that it charges me fees for anything it possibly can. But if I am in financial distress I will borrow from it since I do not have a choice. Equally the bank does not trust me. Consequently, it demands proofs of employment and salary before it lends large sums of money to me.

Is trust stronger in Islamic institutions, namely in Islamic finance? Inter-bank lending between conventional banks dried out almost completely during the hottest phase of the financial crisis. This was interpreted by some economists as sign of lack of trust. Financial markets will only return to a healthy position once this trust is reestablished (interestingly, economists stating this insight rarely clarify how trust could be reestablished).

Did inter-bank lending among Islamic banks remain stable during the recent crisis, indicating more trust among Islamic banks? This question is not easy to answer since Islamic inter-bank lending is not fully developed. Islamic banks tend not to engage as actively in borrowing and lending among each other as conventional banks. Their reserves, therefore, often exceed the legally necessary thresholds substantively. In 2006, Islamic banks in Indonesia held ten times as much excess reserves as their conventional counterparts, namely 20 percent of total deposits [Islamic Financial Services Board (2008)]. Furthermore, if Islamic banks engage in inter-bank money transactions they in fact mostly interact with the central bank or government institutions. Instruments purchased in inter-bank money markets are rarely traded in secondary markets but rather held until maturity. These observations are simultaneously the reason for and the result of a poorly developed secondary market for Islamic inter-bank lending instruments [Islamic Financial Services Board (2008)]. Yet, this fact could be interpreted as a lack of trust among Islamic banks. Surely if they prefer to borrow from the lender-of-last resort, the central bank, and not from fellow banks, Islamic banks cannot possess a lot of trust in each other.

Arguably, the low inter-bank lending volumes are a result of the complicated structure of Islamic inter-bank lending. Since finance activity needs to be asset-backed Islamic inter-bank transactions typically involve purchases and sales of commodities to back the actual borrowing or lending. Any generated profit by the borrowing bank has to be shared with the lending bank since profit-and-loss sharing is mostly the basis of such transactions. In Malaysia, this share of profit that the lender receives in exchange for its funds has to be dictated by the regulator since Islamic banks used to understate their profits in order to minimize payments to banks from which they borrowed [Bacha (2008)]. This may be anecdotal evidence that trust among Islamic banks is not sufficient to ensure the stability of inter-bank operations and regulation is as crucial for Islamic as for conventional finance.

Hence, morality and trust do not seem higher in Islamic finance. Reviewing data on inter-bank transactions in Malaysia, which possesses the most advanced Islamic inter-bank market, this argument is further strengthened. Malaysia was hit by the financial crisis and global recession only by late 2008 mainly through the channel of trade and financial flows. At the same time, dramatically falling lending volumes for short-term inter-bank lending transactions could be observed in the Islamic inter-bank money market. The volume of Islamic short-term inter-bank instruments – including overnight and weekend transactions as well as transactions over the periods of one week and one month – hit an all-time low by November 2008 falling to 4707. The long-term average since the Islamic inter-bank money market was launched in January 2001 is 21887 transactions per month. Earlier low points never fell below a volume of 11000 transactions per month (Figure 3).

Source: IIMM, 2009

Figure 3 – Short-term Islamic inter-bank transactions in the Islamic inter-bank money market

Evidently, the financial crisis had a profound impact on the Islamic inter-bank money market. A complete drying-out was probably avoided through the extensive involvement of the Malaysian Central Bank in the market. Equally, conventional inter-bank lending was revived through central bank engagement either via direct liquidity injection or guarantees backing money market transactions. Hence, conventional and Islamic inter-bank lending function very similarly.

Conclusion

In conclusion, there is little reason to believe Islamic finance is fundamentally different from conventional finance. Its apparent resilience to the current crisis in certain areas – such as the Islamic inter-bank money market in Malaysia – is rather a symptom of its underdevelopment. Once, Islamic finance steps through the door of the financial mainstream it is more than likely to exhibit the same characteristics. In this respect, Islamic finance can be a religion-based version of the religion-like belief in the self-regulating and self-stabilizing conventional finance. This belief contributed a great deal to the destabilizing trends in current financial structures.

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PART 2

A Case Against Speculation by Deposit Taking Banks

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Abstract

This article argues that by speculating and taking equity risk deposit taking banks violate their implicit fiduciary responsibility as custodians of depositors' money. A simple model is developed to show that even unsecured personal consumption loans such as credit cards could expose depositors to undue risk during a recession. The article also shows that when deposit taking banks take a speculative position in the equity of a company, this investment sends misleading signals to capital markets about the credit worthiness of that company and impacts the company's cost of capital, which could lead to suboptimal allocation of capital in the economy. For illustration, the methodology is applied to the case of Dell Computer Company.

One characteristic of the recession of 2008 that sets it apart from others is the enormous amount of taxpayers' money that the Federal government has spent to save and prop up big banks and shore up the banking system. The need for such a bail out is counter to the central tenet of a traditional bank that is supposed to be an intermediary that collects and combines the deposits of small savers and makes them available to sectors of the economy in need of capital for expansion and growth. Of course, depositors recognize the fact that banks, by lending money, will be taking credit risk, however, they do not expect to become exposed to undue risk as a consequence of banks speculating with their money. Otherwise, they can easily invest their money in any of the plethora of risky investments available to them with far more attractive risk-adjusted returns than the puny interest that they receive on their deposits.

Consequently, one of the primary responsibilities of a bank is to safeguard the money that is entrusted to it by its depositors. Traditionally, banks have paid close attention to this fact because deposits have been their primary source of funding and a bank could not function without them. Banks have been assiduous not to engage in activities that would breach the confidence of depositors which could result in a run on a bank and ruin it. Over time, however, thanks to the so called "financial innovations," deposits have been replaced as the primary source of funding for banks by instruments such as commercial papers (CP), Medium Term Notes (MTN), credit or equity linked note, auction rate notes, and a host of other structures. And in the process, banks' management has become lax in discharging their fiduciary responsibility as guardians of depositors' money. These instruments have also played a crucial role in the burgeoning of shadow banking in which banks pretend to solely play the role of an intermediary and claim that practically all their risks are transferred to third parties – that unfortunately have turned out to be thinly capitalized.

Banks have not been transparent in explaining that these third parties can draw on them and at the end of the day the banks could end up holding the bag. This has been the magic of "financial innovation" that together with unrealistic models of rating agencies and their conflict of interest has made risk disappear into thin air and with it the need for risk-based capital. Unfortunately, accounting rules have also allowed certain activities to stay off balance sheet thus giving investors and depositors the false sense of security that banks have enough capital for the risks that they are carrying and all their other risks are hedged. Unfortunately the nature and financial soundness of these hedge counterparties are not usually discussed and most questions are brushed aside by the buzz words such as "mutual margining." By the way, the motion to move CDS trading to exchanges is a result of this opaqueness. Easy credit, ample liquidity, friendly accounting rules, and financial innovations such as CDO technology have helped banks to essentially replace their original business model with that of "originate and distribute."

The repeal of Glass-Steagall act has accelerated this process and has caused the business model of collecting deposits and prudently lending them to companies to take a back seat to what has turned out to be speculation on the part of banks – the main theme of this article. Banks by speculating, betray their responsibilities towards depositors. Further, as will be argued later, this speculation also sends the wrong signals regarding the credit worthiness of certain transactions, thus leading to sub-optimal allocation of capital in the economy.

Depositors and bank's fiduciary responsibility

Depositors of a bank can be viewed as super senior debt holders with the difference that depositors for whom preservation of capital is of paramount importance also implicitly deem banks as custodians of their money. Consequently, mangers of traditional banks are in the difficult position of balancing the interests of equity holders with those of depositors. A proprietary trading operation that benefits the stock holders while putting depositors at risk is inherently inconsistent with the tents of a traditional bank that needs a stable deposit base because unlike, say, technology firms, it cannot operate with shareholder equity alone. Clearly, the primary concern of depositors is the safety of their money and concepts such as risk-adjusted return rarely comes into their calculations when entrusting their savings to a bank. FDIC insurance has been instituted to assure small depositors that their money is safe and prevent this source of capital and credit to go under the mattresses and become unavailable to the economy.

A bank that engages in proprietary trading and speculation runs the risk of undermining this fundamental understanding and trust. Of course, speculation like beauty is in the eye of the beholder and there are cases where the boundary between speculation and investment are blurred. In the extreme cases, however, the distinctions between the two are quite clear. For example, a buy and hold trade is clearly an investment while day trading is speculation. Generally speaking, speculations are short term and focus on price movements rather than the underlying business fundamentals and often have stop loss or take profit levels associated with them. In the case of propriety trading, risk-adjusted return is also important since it determines the amount of leverage needed to achieve certain returns. On the other hand, the two concepts of risk-adjusted return and leverage are alien to the decision process of a depositor when he decides to hand over his savings to a bank.

Lack of attention to their fiduciary responsibilities towards depositors could result in financial activities by banks that will benefit equity holders at the expense of depositors. During boom times these activities create the illusion of money machines and the weaknesses of their business models and practices become evident only during a bust. Consider the case of unsecured lending for personal consumption and in particular that of credit cards. It is unlikely that depositors would consent to lending their money to a credit card holder for a cruise to Caribbean or a romantic

dinner at an expensive restaurant. Banks, however, argue that they let credit cardholders use their cards for personal and discretionary spending because applicants are carefully screened for their paying ability and the credit lines extended to them is based on a detailed statistical analysis of historical data that uses information such as age, income, education, etc. Further, by having a large number of credit card holders the risk of loss is greatly reduced. They use an argument along the following line that if on average credit card holders keep a balance of B on their cards and pay an interest of R on this balance, the expected annual revenue from each card holder is BR. Suppose the chance of a cardholder defaulting on his/her obligations is p and the bank fails to recover any of its claims. In this case the expected annual revenue from a card holder will be $B[(1-p)R - p]$. This revenue has a standard deviation of $B(1+R)\sqrt{(1-p)p}$. Suppose the cost of running a credit card operation is C and there are n card holders. Let $\sum x_i$ be the total interest payments of card holders in a year. For the credit card operation to break even the interest received should exceed the operation cost; that is, the inequality $\sum x_i \geq C$ should hold. Let us rewrite this inequality as

$$\{\sum x_i - B[(1-p)R - p]\}/ [\sqrt{n}\, B(1+R)\sqrt{(1-p)p}] \geq \{C - n\, B[(1-p)R - p]\}/ [\sqrt{n}B(1+R)\sqrt{(1-p)p}]$$

If we assume x_i's i.e., payment of cardholders, to be independent – a crucial and to some extent reasonable assumption during a boom and easy credit period – the left side of the above inequality has approximately a standard normal distribution Z and

$$\Pr [\sum x_i \geq C] = \Pr \{Z \geq C / [\sqrt{n}B(1+R)\sqrt{(1-p)p}] - \sqrt{n}\, [(1-p)R - p] / [(1+R)\sqrt{(1-p)p}] \}$$

According to this equation, the smaller the right side of the above inequality, the higher the chance that the card business will be profitable i.e., for a successful card business one should have

$$C - n\, B[(1-p)R + p] << 0$$

or equivalently the number of card holders should be

$n >> C/B[(1-p)R + p] \approx C/BR$ (if p, the percentage of card holders who default, is small)

For example, if the cost of running a card operation is $10 million a year and on average card holders keep a balance of $200 in their accounts and pay an 18% interest on them, then $C/BR \approx 112{,}000$. In this case a card business with even 250,000 customers would very likely be quite profitable. Moreover, banks argue that the risk of this business is further reduced by securitizing the credit card receivables. Unfortunately the recent recession has demonstrated the fallacy of this argument.

Clearly, the lower the operating cost the easier it is for a card business to be profitable even with a small number of cardholders provided the chance of default is low. The use of technology and outsourcing the processing and call centers by locating them in countries with low labor costs has greatly reduced the cost of running a card business and has made it possible for even small businesses to offer their own brand of credit cards. Since there is a limit to how far the operating cost can be reduced, any additional profit should come from having more card holders, as demonstrated by the second term of the right hand side of the above inequality, i.e.,

$$\Pr \{Z \geq C / [\sqrt{n}B(1+R)\sqrt{(1-p)p}] - \sqrt{n}\, [(1-p)R - p] / [(1+R)\sqrt{(1-p)p}] \}$$

namely

$$\sqrt{n}\, [(1-p)R - p] / [(1+R)\sqrt{(1-p)p}]$$

Based on this result, it should come as no surprise that during the period of easy credit so many banks were offering so many pre-approved credit cards to so many people, with the argument that although the probability of default might increase it is more than offset by the high interest rate R and the large number of card holders n. Unfortunately, the banks were inattentive to the fact that during a recession and in the event of high unemployment, the assumption of independence of cardholders' payment no longer holds and that the risk of card business becomes much higher and this could expose depositors of a bank to credit risk of its credit cardholders. In the U.S., in addition to high unemployment, legislations that have been introduced to limit the interest rate that banks can charge on the balance of credit cards has compounded the problem and has resulted in a scramble by banks to reduce the limits on the credit cards of many of their cardholders. Some have even canceled the credit cards of some of their customers altogether.

Misleading economic signals

A less apparent but equally disturbing aspect of speculation by banks in equity markets is the misleading signal that it sends to lenders regarding the riskiness of companies that are subject of the speculation. When a traditional bank goes long the equity of a company, it gives a false impression about credit worthiness of that company, thus enabling the company to leverage itself with greater ease and lesser cost. Conversely, when a bank shorts the stock of a company, it implies that the company has become riskier thus increasing the company's cost of borrowing and possibly put it in financial distress. This is particularly important for companies that use short term borrowings such as commercial papers for their everyday operations. The current credit crisis has demonstrated the speed with which companies could lose their ability to roll over their short term borrowings and how severe the consequences of this could be. For example, Lehman Brothers collapsed when it lost its access to short term

borrowing and the government refused to step in as the lender of the last resort. To quantify the consequences of speculation by traditional banks, let us recall that the primary concern of a lender is the safety of his principal. A company is technically bankrupt if the value of its assets falls below that of its liabilities. Let us represent the liabilities of a company and its tangible assets that have liquidation value in the case of bankruptcy at time t by L_t and A_t respectively. The company will be technically bankrupt if its net asset value (NAV) $S_t = A_t - L_t$ falls below zero. Further, growing NVA is one of the main responsibilities of the management. Let R(t) be the rate of this growth. The following equation represents the changes in NAV for periods t = 0, 1, 2, …, n

$$S_{t+1} - S_t = \Delta S_t = [R(t) + u_t] S_t + v_t$$

In this equation u_t is a random variable representing the uncertainty associated with the performance of company's management. Similarly, v_t is a random variable representing the uncertainty associated with the state of the overall economy and the company's sector. Should there be a dividend D_t, the above equation becomes:

$$S_{t+1} - S_t = \Delta S_t = [R(t) - D_t + u_t] S_t + v_t$$

The continuous time version of the above equation is

$$dS_t = [R(t) - D_t + \sigma_1 (t, S_t)\, dw_1] S_t + \sigma_2 (t, S_t)\, dw_2$$

Where dw_1 and dw_2 are standard Brownian motions with correlation $\rho(t, S)$. Clearly, the cost of company's borrowings is directly proportional to the chance that it will fail before the maturity of its borrowings. For maturity T, let $Pr[S_t < 0 \text{ for } t < T]$ be the probability that the company becomes technically bankrupt before time T. This probability can be estimated from the above model using simulation. In many cases, however, reasonable approximations can be obtained as will be shown later. Speculation by traditional banks in the equity markets impact this probability, hence the credit spread of the company. Let us define the "growth premium" (G) as the multiple of NAV that investors pay for the stock of a company namely:

G = market capitalization/ NAV

This number is a function of growth rate R(t) and the uncertainty about the company and the economy, i.e., $\sigma_1(t, S_t)$ and $\sigma_2(t, S_t)$. When a traditional bank buys the equity of a company and causes the stock price to appreciate then either the growth premium increases, which implies a higher rate of asset growth and hence a lower chance that NAV will fall below zero, or, if growth premium is assumed to be as before, then higher equity price implies a higher NAV. This increase in NAV has similar implications about the chances that the company will go bankrupt. In either case, the credit worthiness of the company will improve which will make it easier for the company to borrow and leverage itself. On the other hand, if the bank short sells the equity of a company and forces the stock price to fall, all the above arguments reverse and the company's cost of borrowing increases. Consequently the action of the bank in either case sends the incorrect signal regarding the credit worthiness of the company that is the subject of speculation.

Example

The following example uses the above model to estimate the impact of speculation by banks on the cost of fund of Dell Computer Company. Certain details that are not pertinent to the analysis have been omitted.

Based on the annual report of Dell Computer Company on January 2010, at the close of 2009, the company had the following assets and liabilities:

+ Cash and near cash items	10,635.00
+ Short-term investments	373.00
+ Accounts and notes receivable	8,543.00
+ Inventories	1,051.00
+ Other current assets	3,643.00
Total current assets	**24,245.00**
+ Long-term investments	1,113.00
+ Gross fixed assets	4,652.00
- Accumulated depreciation	-2,471.00
+ Net fixed assets	2,181.00
+ Other long-term assets	6,113.00
Total long-term assets	**9,407.00**
Total assets	**33,652.00**
Liabilities and shareholders' equity	
+ Accounts payable	11,373.00
+ Short-term borrowings	663.00
+ Other short-term liabilities	6,924.00
Total current liabilities	**9,051.00**
Total liabilities	**28,011.00**

On December 31, 2009, the closing price and the number of outstanding shares were $14.61 and 1,944.7 million respectively. This implies a market cap of $ 28,412 = $ 14.61 * 1,944.7

It follows that NAV and Growth premium at the beginning of 2010 were

A_0 = total assets = $ 33,652

L_0 = total liabilities = $ 28,011

Net asset value S0 = $A_0 - L_0$ = $ 5,641

Growth premium = (total market cap /S0) = ($ 28,412/ $ 5,641) = 5.04

Following table gives the same data for the previous ten years.

Year	Total assets	Total liability	Net asset value	Change in asset value
2001	13,435	7,813	5,622	
2002	13,535	8,841	4,694	-928
2003	15,470	10,597	4,873	179
2004	19,311	13,031	6,280	1,407
2005	23,215	16,730	6,485	205
2006	23,252	19,205	4,047	-2,438
2007	25,635	21,307	4,328	281
2008	27,561	23,826	3,735	-593
2009	26,500	22,229	4,271	536
2010	33,652	28,011	5,641	1,370

Following is the stock price and market capitalization of Dell on the last day of the previous ten years:

Date	Closing price	Market capitalization
12/29/2000	17.44	33,916
12/31/2001	27.18	52,857
12/31/2002	26.74	52,001
12/31/2003	33.98	66,081
12/31/2004	42.14	81,950
12/31/2005	29.95	58,244
12/31/2006	25.09	48,793
12/31/2007	24.51	47,665
12/31/2008	10.24	19,914
12/31/2009	14.61	28,412

According to the above tables, the annual change in net asset value has a mean of $2 million and a standard deviation of $1,197 million. Consequently, for all practical purposes one can assume growth rate R(t) to be zero. Let us determine the "fair" spread – i.e., borrowing cost – over LIBOR for a five year senior unsecured debt of Dell at the time of the writing of this article, i.e., September 17, 2010. It should be noted that this spread is the same as the premium of five year credit default swap (CDS) of Dell.

According to the above table, the growth premium at the start of 2010 was

5.04 = market capitalization/net asset value = 28,412/5,641.

On September 17, 2010, the company had 1,944.708 million shares outstanding and its stock closed at 12.45.

The market cap on this day was $12.45 * 1,944.7 million shares = $24,211 million.

Given that from the beginning of 2010 until September 17th, there had been no major changes in the management of the company or its business model, we assume that growth premium to be unchanged, i.e., 5.04. The next step is to determine the chance that NAV of the company would fall below zero within five years. Given that the standard deviation of changes in NAV is $ 1,196 million, a rescaling of the problem transforms it to calculating the probability that a standard Brownian motion starting at zero hits the barrier -4.0175 = 4,807/1,196.53 within five years.

This probability is 7.24%. = 2* [1- N (|-4.0175|/√5)]

where N(x) is the cumulative distribution function of the standard normal random variable.

To simplify the discussion, let us assume the company defaults only at the end of each year with probability p. This implies the chance that the company defaults within five years is 1- (1-p)5. For this probability to be the same as that given by continuous time model, we should have 1- (1-p)5 = 7.24% or

p = 1- (0.0724)1/5 = 1.448%.

Using market convention of an expected recovery rate of 40% and ignoring discounting, which is a reasonable assumption given the prevailing low interest rates, we have

Expected loss = probability of default * loss in the case of default = 7.24% * 60% = 4.34%.

The "fair" credit spread Δ should satisfy the following equation:

4.34%. = Δ [1+ (1-p) + (1-p)2 + (1-p)3 + (1-p)4] = Δ * 4.85

Solving this equation implies that the credit spread should be about 89 bps. It is interesting to note that the five year CDS of Dell on September 17, 2010 was 87-92.

Suppose a speculative attack by banks on Dell results in a 30% drop in stock price. In this case the above approach under the assumption of no change in growth premium implies a credit spread of 456 bps or almost a five fold increase in the borrowing cost of the company. Conversely, suppose a bank buys the shares of the company and the stock appreciates by 50%. In this case the funding cost is expected to reduce to a meager 14 bps, i.e., that of a AAA company. It is interesting to note that during the CDO craze, most of the debt in the cash CDO structures had a spread of about 100 bps and the tranches above 8% that were often held by banks were deemed to be AAA with a spread in the range of 10 to 30 bps. After the crash, these AAA tranches had to be marked down by 25% to 50%.

Conclusion

Banks with traditional mandate of channeling the savings of small savers to sectors of the economy in need of capital have the fiduciary responsibility of protecting this capital. Consequently, they should not engage in speculation by taking equity positions in companies since this violates their fiduciary responsibility and will send the wrong signals to the economy. A long speculating position implies that either the prospects of the company are more certain or the rate of asset growth and profitability is higher. This could make it easy for the company to leverage and enter into risky businesses. Similarly, a short speculating position implies that either the prospects of the company are less certain or the rate of asset growth and profitability is lower than expected by the market. This could increase the cost of capital of the company or shut it out of capital markets altogether and put the company in financial distress.

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The Emergent Evolution of Human Risks in Service Companies Due to Control Industrialization: An Empirical Research

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Abstract

Service enterprises have traditionally used organizational models from the manufacturing and industrial sectors, incorporating ideas such as hierarchy, task repetition, and standardization of procedures. However, these disciplined production systems tend to use humans more than machines in the production of services, which we posit may lead to significant organizational problems. Consequently, we conducted an ethnographic study on the notion of "human risks" in service companies from the Geneva region, which is known primarily for its banking sector. Our study is based on transcripts from more than sixty semi-directed interviews conducted over the last two years. Our findings and analyses indicate that service companies are indeed quite "industrialized," and that "process normalization," which is intended to mitigate operational risks in service industries, is actually at the core of significant organizational risks.

1 We would like to thank the students of LEM-HEG, who participated in creating the survey and in the data collection and transcription of answers. Without them, this research would not have been possible. We would also like to express our gratitude to Professor Jean Tuberosa, Director of the Market Studies Laboratory at the Geneva School of Business Administration. Finally, we thank Noelle Schultz for her invaluable editing work.

Service enterprises have largely based their organizational models on those from the manufacturing and industrial sectors (i.e., incorporating hierarchy, task repetition, standardization of procedures). The "Taylor" model, first instituted in the industrial arena, has been the standard in the service sector. It calls for standardizing and simplifying tasks, while emphasizing repetition. In organization theory, these standardized and centralized organizations are referred to as mechanistic (as opposed to less formal and central organizations; we use the term "industrialized production" here to refer to mechanistic organizations).

We note that service enterprises have become virtual prisoners to written instructions. There is an inordinate emphasis on documenting and describing procedures and their functions in detail. It has even reached a point where some enterprises believe it is possible to replace most human expertise with written instructions. We contrast that with a manufacturing plant, where production follows a linear process, beginning with the processing of raw materials, and ending with the storing and/or selling of the final goods (also known as a "make-to-stock" process in operations management terminology). However, service production obviously cannot follow this system.

Today, most wealth comes from the production of services. However, because of their intangible and heterogeneous nature, analyzing knowledge-based services is more complex than analyzing the manufacture of goods. First, the life cycle of a service is determined primarily by the contractual relationship between the provider and the client. Second, production obeys supply chain logic, while the "raw material" (or the input) for a service often comes from the customers themselves, who may intervene at various levels of the production process (in the service science arena, this important idea is referred to as "co-production").

Most of the "production" factors of services correspond to human qualities (soft skills) that by their nature are subjective and not quantifiable. Thus, raw materials are replaced by knowledge. In service science, knowledge is divided into two main categories: explicit (or information, which can be clearly classified and is codifiable), and implicit (such as expertise, experience, or knowhow, which is harder to classify and can be somewhat amorphous). These characteristics make the production of services complicated to control. And control corresponds to an essential part of management, with four critical components:

- **Planning –** the coordination of short- and long-term objectives for the company and its operations procedures.
- **Organization –** creating a framework for the company that enables the objectives to be met.
- **Involvement –** the active participation of employees in meeting the objectives.
- **Control –** assuring that the first three components function properly.

Control is obviously one of the key components of meeting the organizational goals. However, the approaches to managing control have changed radically over the last two decades. And these changes are probably attributable more to the IT (information technology) revolution than the "servicization" of the economy. Indeed, we note that ERP (enterprise resource planning) systems and IS (information systems) are increasingly becoming the backbone of a service company.

Before ERPs were used in the manufacturing sector (particularly in the automotive sector, with a precursor of the ERP called an MRP), their primary purpose was for activities such as managing huge numbers of components and supplier relationships. Banks were also early adopters of such systems, having developed IT systems to manage back office processes and accounting tasks. So control has essentially moved from being paper-based to being "electronic." This move is also known as document de-materialization, and is today generalized within service production processes, reinforcing its intangible nature. We emphasize that IS deployments are made possible only by the standardization and centralization of service production, two important pillars of modern industrialized organizations. We thus posit that today's control systems have contributed greatly to the industrialization of service companies.

Note that the title of this paper uses a provocative term, "control industrialization," instead of the more common "service industrialization." The choice of this term is significant. We cannot assume that every sector of the tertiary economy has adopted a generic industrialized model, even if, operationally, large service companies tend to have many similarities. On the other hand, in the U.S., many organizations have adopted the COSO model (from the 1992 report of the Committee of Sponsoring Organizations of the Treadway Commission). This would suggest we can make some basic assumptions regarding control. In fact, most internal auditing departments in public companies now rely on the COSO model. According to the IIA glossary (Institute of Internal Auditors, www.theIIA.org), the term "control" in this context is taken to mean: "Any action taken by management, the board and other parties to enhance risk management and increase the likelihood that established objectives and goals will be achieved." In The IIA Performance Standards, standard #2100 – "nature of work" states: "The internal audit activity must evaluate and contribute to the improvement of governance, risk management, and control processes using a systematic and disciplined approach." A systematic and disciplined approach is typically a scientific approach to management.

As we indicated earlier, most modern production methods rely more on human contributions by way of IT processes than on manufacturing machines. And it is necessary to formalize and centralize IT processes in order for them to function properly. Machine breakdown is typically an operational risk that is well handled through SPC (statistical process control) techniques. But how should a human production disruption be

managed? The news is filled with stories of employees suffering from work illnesses such as burnout and depression. Such illnesses have been intensively studied by work psychologists and sociologists. However, we do not know of any studies thus far on how human breakdowns as an organizational risk can impact industrialized service production processes. And, at the extreme, we posit that control industrialization of service companies can give rise to human risks that could prevent companies from "achieving established objectives and goals."

This notion of human risk as an organizational risk is not yet well-defined, but we believe it is imperative that it be better understood. We conducted an exploratory study in the area of Geneva, a Swiss city known for its banks. Our fieldwork is based on ethnomethodology in order to understand the meaning of the following paradox: as control industrialization increases, human risks also increase. It is indeed a paradox, as one of the main roles of the control function has been to "enhance risk management."

Literature review

Service science: a new academic field that captures the essence of service production

Service science is the study of service systems and the co-creation of value within complex groups of resources, participants, and processes that interact to create value [Spohrer et al. (2007, 2008), and Vargo et al. (2006)]. A service system is an arrangement of resources (such as people, technology, and information) connected to other systems by value propositions through their evaluation and acceptance [Spohrer et al. (2007, 2008)]. Service providers' value in the market is based on their competencies and capabilities (skills and knowledge). This value is accepted, rejected, or unnoticed by other service systems in need of resources. The IHIP paradigm (intangibility, heterogeneity, instantaneity, and perishability) is normally used to describe service activities. Compared to the production of goods, services display a much higher degree of most of the four IHIP dimensions [Parasuraman et al. (1985)].

The influence of IT systems on service production

The organizational changes that have taken place because of the new IT and ERP systems are very well described in the literature. Authors generally agree that ERP systems impose "generic processes," and are believed to provide businesses with the "best practices" [Davenport (1998)]. Moreover, academic research notes that some ERP characteristics, such as integration (of business processes and data), standardization of work, and centralization of internal services, have transformed management accounting [Scapens and Jazayeri (2003)]. Information technology and organizational change are the two most important change drivers in this field [Yazdifar and Tsamenyi (2005)]. How ERP system implementation impacts employees' work practices has also been studied in detail [Kumar et al. (2002), Arnold (2006)]. Because banking services have been thoroughly industrialized in most major financial institutions (i.e., the "Taylor-Ford" model), IT systems have enabled banks to achieve significant economies of scales and to "manufacture" at a minimum cost. This requires standardization and commoditization. Dubosson et al. (2009) find that even wealth management, the main service provided by private banks, has become largely industrialized because of reliance on advanced information systems.

The development of ICS (internal control systems)

According to COSO, an internal control is: "a process, effected by an entity's board of directors, management and other personnel. This process is designed to provide reasonable assurance regarding the achievement of objectives in effectiveness and efficiency of operations, reliability of financial reporting, and compliance with applicable laws and regulations." In recent years, most organizations have implemented some type of internal control system (ICS). These tools appear to be quite successful at improving corporate governance [Maijoor (2000)], although it is questionable whether instruments such as SOX (the Sarbanes-Oxley Act of 2002) have had the desired effect. However, ICS implementation may not provide the correct balance of risk management approaches. And logistical and psychological barriers may affect proper deployment [Catenazzo and Fragnière (2010)]. Consequently, regulations and standards mandate that risk management and internal controls should be used as widely as possible. It is well known that regulations are most effective when each person understands, accepts, and attempts to comply with them [Hillison et al. (1999)]. If basic regulations appear inefficient, there is the risk that public and private boards may require further directives; and an overlapping of rules, norms, or standards on corporate risk management and internal controls would be totally counterproductive [Durden and Pech (2006)]. (Note that, in this article, we use the term "norms" interchangeably with the term "standards.")

The "hyper-normalization" of control processes

Publicly designed regulations such as the "Loi de Sécurité Financière" in France, the SOX in the U.S. [Allegrini et al. (2006), Dworkin (2007)], the "Combined Code on corporate governance" in the U.K. [Spira and Page (2003)], and the new ICS regulations for SMEs (small and medium enterprises) in Switzerland [PricewaterhouseCoopers (2006)] are designed to impose risk management standards and internal control practices on organizations within their jurisdictions. Professional boards are also engaged in a process to devise a vocabulary and an established set of norms, such as the ISO 31000 standards (International Organization for Standardization). As Suddle (2009) notes, these are expected to be a thorough framework for implementing a common approach to risk management across countries.

How human risk poses an organizational risk

The term "human risk" in an economic context refers to human capital risk, which can be defined by the two main production variables: capacity

and loading. A more recent use in economics, particularly in behavioral finance, pertains to human risk aversion [Kahneman and Tversky (1979)]. Perceived risk is another type of risk that has been extensively studied in the field of services marketing. The effect of perceived risk is believed to be greater for some consumer services [Guseman (1981), Mitchell and Greatorex (1993), Murray and Schlacter (1990)]. In our study, we find that the idea of human risk is increasingly used to mean that company objectives may not be achieved due to a problem with a human origin. It thus corresponds in this context to a socio-psychological risk that emanates from the activities of organizations. Even if sociology and psychology are extensively investigating at-risk human behaviors [Dollard et al. (2007), Laaksonen et al. (2010), Leka et al. (2010)], we believe human risk is not well defined within the professional practice of enterprise risk management (ERM). To our knowledge, there is no mention of it in the ERM-COSO II text (published in 2005), or in the ISO 31000 norms.

Conclusion of the literature review

Our brief literature review reveals that the notion of human risk in industrialized service companies corresponds to a new social phenomenon, control industrialization. Academic and professional studies in control and risk management have not integrated this issue yet, which confirms the need for further research.

Research design

We believe this is the first paper to investigate the notion of human risk as an organizational risk in large service companies with standardized production processes. As such, our primary research question is: can control industrialization, whose main objective is to mitigate organizational risks, actually be the impetus for significant human risks?

Research methodology

We chose the philosophy of "interpretivism" as the most appropriate for the scope of our research. Its main objective is to understand how the human factor can become a source of organizational risk within industrialized service companies. Thus, a comprehensive understanding of this issue is necessary in order to conduct data collection and address the research question effectively. We believe this inductive approach is the most suitable for our research, considering all of these elements.

As noted earlier, we followed an ethnographic research strategy. Saunders et al. (2007) state: "Its purpose is to describe and explain the social world that the research subjects inhabit in the way in which they would describe and explain it. It is a very appropriate strategy in business, if the researcher wishes to gain insights about a particular context and better understand and interpret it from the perspectives of those involved." This approach is well suited for understanding situations facing deep structural change, such as the current global economic situation. The research constituted a vehicle for studying the evolution of large industrialized and global services companies (for example, Wal-Mart, which has approximately 1.8 million employees).

Questionnaire and interviews

We designed a questionnaire with the goal of uncovering "meanings" related to the social phenomenon of the "emergent evolution of human risks due to control industrialization." We conducted semi-structured interviews with managers and employees of service companies, and unstructured interviews with customers and employees. We also used secondary data from various publications, reports, and special editions.

The semi-structured interviews [Combessie (1999), Fenneteau (2002)] were designed to provide respondents with enough freedom to discuss and share their experiences with the analyst, who would then either redirect the interview to explore additional patterns, or conduct further interviews [Gavard-Perret et al. (2008)]. The structure was as follows. The analyst first met the respondents, and asked for a few details on education, professional path, and experience. Each respondent was then asked five questions:

1. How do you perceive human risks in your organization? This was an introductory question intended to obtain respondents' general definitions of human risk. Because there is no commonly accepted definition as an organizational risk, we wanted to understand how it is viewed by our respondents.

2. Do you observe at-risk behaviors in your organization? This question was designed to help us understand what types of risks respondents observe in their own organizations.

3. According to you, is there a way to measure human risks? This question represents a first link with the assumption that large service companies are industrialized. According to the tenets of management science, every production step is measured objectively (in a formula with input and output variables). Consequently, we need to learn how respondents, all service sector employees, would characterize human risk measurement.

4. Is normalization a way to protect the organization from human risks? This question is underlined because it is at the core of our study. We have noted afterward that there was no need to explain normalization, as it seems respondents were well aware of its meaning (formalization or industrialization of the organization).

5. What are the tools to deal with human risks? This question logically follows from the previous one. We wanted to learn whether respondents believe their organizations are specifically equipped to deal with human risks.

Population

Our empirical research focused on perceptions among the Geneva population regarding the emergent evolution of human risk in service companies. Geneva is located in the heart of Europe, and is home to numerous local and international organizations. The population is composed of about 38.4% foreigners and 61.6% Swiss citizens, with a further 60,630 people who work there but live in the surrounding French territories [Source: Cantonal Office of the Statistics of Geneva (2007)]. Several banks, insurance companies, logistics firms, and other service industries have chosen Geneva for their offices, European branches, or headquarters. Geneva is thus an interesting place for social research, especially on topics of international interest related to the service sector.

Our research was conducted from February 2010 to June 2011 by the LEM (Laboratoire D'Etudes de Marché) of HEG (the Haute École de Gestion of Geneva). The data collection consisted of more than sixty semi-directed interviews, with transcripts by the authors and our postgraduate risk management students. HEG created LEM five years ago, with the goal of teaching students about social data collection and analysis (i.e., survey research, ethnomethodology, social experimentation). We tended to choose topics of public interest for the Geneva population, where the economy is composed primarily of tertiary sector employers. Thus, the notion of human risk in service organizations could include the risk of information pollution [Dubosson and Fragnière (2009)], or of resistance to change when implementing an ICS [Catenazzo and Fragnière (2010)].

As we noted, our respondents were mainly employees of large service companies (with more than 250 employees) in the Geneva area. The banking sector was particularly well-represented in our overall sample of more than sixty individuals. However, respondents also came from professions such as risk management, operations, human resources, and IT, and they held different hierarchical positions (upper and middle management, employees, etc.).

Results

We first provide a summary of the transcripts obtained during our fieldwork. To simplify the analysis, we use the five open questions from the questionnaire as an outline, and illustrate with actual respondent quotes. The discussion section then develops several hypotheses related to our main research question.

Question 1 – how do you perceive human risks in your organization?

The survey results show, almost unanimously, that human risk is considered to be one of the most serious organizational risks. The respondents felt that human risk resulted mainly from a lack of supervision and management in the organization. Over 60% had experienced problems related to inefficient resource management and a lack of clear organizational structure. Human resources also played an important part in this risk, with policies that were nonexistent or weak, poor hiring practices, and a lack of emphasis on managing and retaining key employees.

Senior HR Specialist: "[In] HR today, we have no responsibility identified [or] organized to work with management on human risk. There are no expectations on the part of management. We have no tools or methods except specific aspects of standardization. We do not have any behavioral methodology to help us ... and we're in a large bank!"

Another problem frequently mentioned was absenteeism, and the risks it creates for the business and other employees. Companies tend to handle this issue by relying on statistical analyses based on objective criteria, such as absenteeism control, staff turnover, and leaves of absence. Some companies, however, do not use any kind of objective analysis, which can be another important source of risk.

Apart from health and safety risks, whose standards are increasing within organizations, other related topics of concern are information leakage, fraud, and employee sabotage. The latter issue may be related to a lack of interest in building employee commitment and loyalty, which can cause employees to disengage. Managers may also be lacking in emotional intelligence, as well as listening and empathic skills. Respondents cited the need for employees to be in close proximity to management and to be able to conduct open dialogues, and how many feel these are lacking.

Project Manager: "Exclusion, lack of motivation, demotivation of some employees [who] do not feel sufficiently involved."

To conclude, the inadequate or inappropriate behavior of employees or managers is considered an important human risk. Three-quarters of respondents expressed human risk in terms of cause, and one-quarter in terms of consequences. The emphasis was on "absent" management, and organizations concerned too much with profitability and not enough with human capital. Consequently, we find that human risks in enterprise cannot be reduced to quantitative management problems. This seems paradoxical, as most risk management approaches are based on the quantitative formula: risk = probability * damage.

Question 2 – do you observe at-risk behaviors in your organization?

Respondents identified risk behaviors related to employees and to the organization, for example, a negative influence from poor staff organization. Fraud, manipulation, and excessive criticism were all cited as hidden costs, and, consequently, major risks to the hierarchy.

Other risky behavior, such as the irresponsibility of managers and employees, willful neglect of duties, lack of helpfulness (manque de serviabilité),

and excessive individualism, were also cited. If the delegation of tasks and power is overly controlled, it can result in employees feeling powerless, and can breed a lack of commitment to the job and the company.

Senior (IO):"Yes, there are risk behaviors that are manifested by individualism, lack of communication, ownership of good results and no failures on the objectives, trends in cheating for the benefit of personal advantage or to discredit others, lack of initiative, the refusal to share information… resistance to change, [and] too rigid and authoritarian leadership."

Service Audit Manager (Bank): "We can say that people [who are] "dissatisfied," unrecognized or find that the behavior of the company is unfair may develop problem behaviors. There is also the anxious person that has the constant fear of losing his job, his salary […] he may hide things just to cope with his family. Then there is the "player," who is found in jobs such as traders; if we see that he will play in the casino for himself, he is not necessarily in the right position."

Regarding risky behaviors related to organizational factors, we find problems such as a lack of commitment of key personnel, or a general lack of due diligence. The respondents also identified the perceptions of fairness and justice (or lack thereof) as posing significant corporate risks.

Director, clinic: "The main risk is characterized by the retention, poor circulation or monopolization of information. Despite the establishment of internal processes, it happens that deficient practices occasionally reappear."

Thus, the deterioration of behavior, dissatisfaction, work overload, overly long decision-making processes, and excessive overtime costs are all risks for the organization. Respondents felt that risk behaviors related to employees were significantly greater than those related to the organization. We thus observe a marked sensitivity to these behavioral questions.

Question 3 – according to you, is there a way to measure human risks?

Respondents believed that measuring levels of expertise or incompetence has become more efficient through the use of more sophisticated performance scales. But respondents noted that some managers appear to prefer qualitative scales that reveal experience and feelings, because they are considered more reliable.

We also observed that satisfaction surveys are on the increase, and feed an increase in internal statistics. Audits, internal controls, and various statistics such as absenteeism, overtime, and turnover have become the basis for managing human capital. It seems as if companies today believe using concrete standards and procedures will ensure quality and productivity. The reporting and scorecards are valued as an aid, a part of standard operating procedures, and a potential method to prevent at-risk situations. There is a consensus that human risk can only be measured through objective dimensions, even if a few managers do not fully believe in these kinds of measurements.

Question 4 – is normalization a way to protect an organization from human risks?

About 50% of respondents noted that standardization/normalization helps prevent and minimize all or part of human risks. The arguments in favor of standardization are as follows:

1. Companies can use standards as part of a coherent framework for fostering constructive change in attitudes and mentalities.
2. Because modern production has essentially been "dematerialized," standards act as anchors, providing concrete principles for institutional reference. They are the touchstone of companies in a world with fewer physical boundaries.
3. Standards provide clear instructions for all, and ensure employees are aware of what is expected from them.
4. In the form of manuals (i.e., FIM = fundamental instruction manuals, GSM = group standard manual/process), standards and norms become the "bible" of a company, illustrating for employees how they are connected to the company's goals.
5. They foster "best practices."
6. They allow for better planning and anticipation of human risks.

For those in favor of norms, they represent a legal and contractual framework that protects employees and businesses.

For those not in favor, they are ineffective as a method of preventing human risk. Those arguments are as follows:

1. Even if the standardization process were formalized, we cannot fully control humans.
2. Standards foster too much complexity and subjectivity.
3. They cannot prevent all risks, because there are too many different types of people and perceptions.
4. Standards do not prevent financial crises (!).
5. Common sense, rather than standardization/normalization, should prevail in all processes.
6. Norms do not guarantee quality results.
7. Norms may not be appropriate for smaller companies.
8. Norms are used too widely to protect the manufacturing stages of products.
9. Anything and everything can be standardized so that processes are respected, but in the event of a crisis, norms may be disregarded anyway.

10. Norms are generally established only after disasters have already occurred (!).
11. Norms exist more as "window-dressing," i.e., for an organization to have a clear conscience and a good image.
12. Norms are too often used for commercial purposes, to attract investors and customers.
13. Organizations use norms as insurance for good company operations.

Director, HR: "There is a substitution of the HR department played by software and computer systems. We create HR portals through computer tool[s] that remove responsibility from the employee and give power to the hierarchy."

In all cases, normalization is expanding in the field of accounting analysis of production, and tends to spread with the same tools that control human resource management. The trend toward industrialization is here, for better or for worse, particularly during this era of control management.

Question 5 – what are the tools to deal with human risks?

Respondents cited communication (listening, dialogue, openness) on the part of management as the most important tool. The concepts of attention and positive reinforcement can promote motivation and prevent conflict. Sharing information and goals are also seen as important to prevent human risks. Having more personal relationships with employees should be of interest to executives. Managerial intelligence and respect for employees were seen as guarantees of success.

Chief Risk Officer (reinsurance): "[A] manage[r] is to love his staff. Tools to manage risk are primarily human intelligence and managerial attention. A manager can make many careful observations and gain information…. Listening and dialogue [are also important]. These tools require that the manager must be close to his team…any behavior out of habit will be quickly detected."

Respondents also noted that managers tend to strongly rely on HR departments. They expect HR executives to stay up-to-date on things like technical tools of personnel management and dashboards to measure HR activities daily.

Executive Director (hospital): "The best tools are recruitment and [the] sharp definition [of tasks] after analyzing the employee profile. [E] stablish[ing] specifications and business processes specific[ally] to enable us to have maximum quality [will] reduce the risk level [of] employees and more generally of the company. Ratings and customer satisfaction surveys are needed to [take] the 'temperature' of the business, leadership, and service."

Motivation was another serious issue cited. In our transcripts, we found that the use of evaluation interviews, development plans, burnout screening, recruitment and training programs, and personality profiles can all be effective in preventing human risk. Many respondents again believe management should be more supportive and available. Some even argued that leadership has shirked its responsibilities.

Finance Controller, SME: "A management and a corporate culture that places the human being among his first priorities will significantly decrease human risk. This must be more than intent and should occur in practice."

Finally, some managers did not endorse any specific tools for human risk management. They did not agree about the importance of this issue. This can represent a cost to the company in the form of wasted time, both for employees and for managers.

Administrative manager, team leader, doctor: " I do not think a management tool for human risk can bring real solutions [or] improvements [to] a company. A more intuitive approach might even give better results. A management tool for human risk [would] probably [just mean] an additional workload for staff responsible for the system."

Discussion

Modern management in certain service organizations follows the tradition of mechanistic organizations: bureaucratic, rigid, and compartmentalized. The idea behind mechanistic theory is that if the organization is working properly, as planned and controlled, the human factor will naturally find its place [Morgan (1997)].

However, the reality is that the human factor can be unpredictable, and this can pose a real risk of failure for an organization's plans. We study the reasons for this. Our conclusions, drawn from our fieldwork, indicate that it is largely due to this "mechanistic" view of management. While recognizing the need for leadership, initiative, kindness, justice, and motivation, firms nevertheless tend to adapt better to the needs of machines than of humans. Management typically approaches organization as a technical matter, but with the stated goal of achieving harmony between the technical and human aspects. But we find that this goal is not apparent to most employees in organizational environments.

For example, managers fail to recognize that today's tasks are much more complex and less clearly defined than those done in the past by machines. The development of new management methods, the streamlining of budgets, and the design of organizational information systems are subtle enough examples of a mechanistic type of command. As evidence, the respondents to our interviews described in detail how scientific methods are being used to determine what and how work needs to

be done. They mentioned information systems used for surveillance as a way to maintain profitability levels, manuals of standards about how to execute tasks in a very formal manner, customized recruitment programs and training, and comprehensive systems of work assessment.

The consequences of these conventional models are also reflected in our transcripts. Because they can be dehumanizing and discouraging for employees, and promote a lack of initiative, they can ultimately generate significant human risks for the organization. Employees start believing their primary focus must be obeying orders and keeping their place, rather than considering how to do their jobs more efficiently. The dichotomy can cause tremendous distress at work.

We emphasize that we believe organizations have worked extensively to increase efficiency and employee satisfaction. Our interviewees revealed that human resource management is increasingly being asked to improve production quality and reduce absenteeism and staff turnover, while encouraging employee motivation. Companies seem to recognize the interdependence of human needs and technology. However, it is worrisome that so much of management remains reliant on purely technical organizational structures.

Conclusion

One habit inherited largely from industrial organizational models is that the service sector tends to develop low-cost models based on the Taylor model. However, we posit that today these models have reached their limits. Due to the intangible nature of services, classical control approaches may not provide the relevant safeguards to enable a service company to reach its objectives. The value and quality of services are generally too complex to measure objectively. Additional difficulties may arise in monitoring risks in management information systems. Indeed, if we assume that the most prominent risks encountered in service industries will be the consequence of "invisible threats," it is obvious more appropriate approaches need to be implemented.

Although organizations believe they are protected from uncertainty by formalizing internal control systems, the reality is much more complex. Organizations remain the product of visions, ideas, and beliefs. Normalizing the control system simply gives a false sense of security. Our investigation seems to be relevant because there is certainly a point of no return for organizations where high rates of absenteeism, staff turnover, and poor product quality will badly damage their reputations and businesses. Nowadays, promoters of norms and standards advocate that formalization leads to transparency of work procedures. However, it also requires employees to become more responsible at the same time. This is a paradox as well as a weakening of the psychosocial state. In practice, employees' requirements of independence and empowerment are not in line with their perceived feelings of injustice (such as non-recognition of their "commitment" to the company). This situation can create personal distress and a chain reaction that risks affecting the whole organization.

On the other hand, hyper-investment in physical and mental work has already been found to cause significant observable effects on humans. For examples, see the results of a European survey, – Fondation de Dublin, quatrième enquête sur les conditions de travail en Europe, 2007.[2] This study notes that work is sometimes perceived as responsible for pathologies such as musculoskeletal disorders (MSDs), which occur from poor physical working conditions (repetitive efforts, extreme joint positions), and psychological strains (from a lack of autonomy, social support, recognition, and general "stress").

In this paper, we posit that human risks may be an underlying cause of organizations failing to meet their objectives. To our knowledge, this is the first paper to investigate that notion of human risk from this angle. We used an ethnomethodological basis to develop research hypotheses that we intend to validate in subsequent research using quantitative surveys. Thus, the lack of validation of our hypotheses is the main limitation of our work. Nevertheless, we believe service companies need to begin considering this key notion of human risk in parallel with the proper definition of business processes. Individual and collective "unawareness" must be examined closely to understand how motivation is nurtured. This means, of course, entering a previously inviolable sphere for organizations. But psychology and sociology can provide answers to these very relevant and subjective issues.

Finally, we firmly believe that the topic of human risk should be investigated on a multidisciplinary scale, because it is such a widespread issue. Considering how natural it is that we service our cars regularly in order to prevent breakdowns, would it also not make sense to service ourselves as workers in order to increase our companies' chances of success?

2 http://www.eurofound.europa.eu/ewco/studies/tn0611018s

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