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**Where has all the Money Gone?**

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**ABSTRACT**

This paper explains how modern developments in lending and liquidity management using short term secured lending contributed to the process of financial sector expansion prior to the financial crisis and its subsequent unwinding. It focuses upon the role of the non-regulated financial sector, and aims to assist readers to understand the answer to the commonly asked question: where has all the money gone? It draws some lessons and policy implications and identifies a number of regulatory issues emerging as the subject of debate.

**KEY WORDS:** Financial crisis; Leverage; Liquidity Creation; Non-bank Financial Sector

**JEL CLASSIFICATION:** E44, E51, G20

1. *Introduction*

The Global Financial Crisis (GFC) has prompted many queries about the workings of the financial system and its regulation. This note addresses two such queries which appear to puzzle many onlookers. First, how did the process of financial sector expansion, increasing leverage, and asset price inflation, and its subsequent unwinding happen? Why didn't Central Bank monetary policy prevent it? Second, where has all the money gone? Who's got it, who are the winners and losers? Some lessons and policy implications are considered in the conclusion. In the analysis, particular emphasis is given to modern developments in lending and liquidity management involving short term secured lending as used by investment banks, hedge funds and other non-prudentially regulated financial institutions globally. The absence of discussion about commercial bank lending growth, securitization, and other financial sector developments, should not be interpreted as downplaying their role in the GFC, but rather the limited focus of this paper.

2. *A Simple Framework*

To answer these quite complex questions, it is necessary to take an extremely simplified picture of the financial system. It helps initially to think of the financial system as an inverted pyramid with three layers shown in Figure 1. The Central Bank is at the apex, acting as the bank for the second layer of (commercial) banks and those, in turn acting as bankers for a third layer of investment banks, finance companies, pension funds, hedge funds etc (as well as for individuals and businesses - who also deal with the third layer of financial institutions). Ryan and Thompson (2007) estimate the size of the third layer at March 2007 at 167.2% of GDP and the second layer at 177.9%.<sup>1</sup> All these participants deal in a range of financial markets (cash, bonds, equities, forex, derivatives), with each other in a variety of ways, and using a variety of often almost incomprehensible financial instruments with fancy acronyms.

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<sup>1</sup> Adrian and Shin (2009) estimate that the balance sheets of US investment banks and hedge funds were more than double the size of those of US commercial banks in 2007.

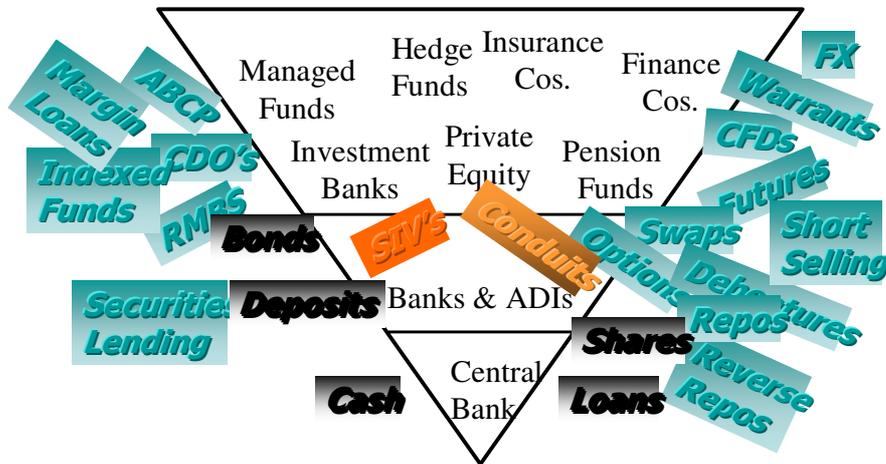


Figure 1: Layering of the Financial System

To keep the analysis simple, assume that there is only one investment bank (IB), one pension fund (PF), one hedge fund (HF) etc., and that they deal in only two shares (of ABC and XYZ companies). Unfortunately, even at this level of simplicity the mechanics of lending, liquidity creation, and asset price spirals are complex. And while the discussion below takes as its starting point a decision by a HF to undertake leveraged investment, that is purely illustrative. The pre-GFC growth in global liquidity and leverage reflected a number of factors including global balance of payment imbalances, lax lending practices, and expansionary policies.

3. *Leverage and Liquidity Creation: An Asset Price Spiral*

Initially, the HF holds 100 ABC shares worth \$1 each financed by funds provided by rich individuals. The IB has cash (bank deposits) of \$100 and 100 XYZ shares worth \$0.50 each financed by its shareholders funds. The PF holds 200 XYZ shares worth \$0.50 each on behalf of its members. Their simplified financial accounts are as follows, where NW represents the net worth of each organization (individual investments with HF, individuals' holdings of shares in IB, and funds contributed by members to the PF). Note

that cash (as held by IB) takes the form of commercial bank deposits. In this illustration the commercial banks (layer 2 in Figure 1) play a passive role. In practice, expansion of lending by banks also contributed significantly to the growth in liquidity.

<b>Hedge fund</b>		<b>Investment Bank</b>		<b>Pension Fund</b>	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
ABC \$100	NW \$100	Cash \$100	NW \$150	XYZ* \$100	NW \$100
		XYZ* \$50			
		* 100 shares		* 200 shares	

Suppose that the HF decides that it would like to increase its leverage (borrow) by \$100 and purchase XYZ shares which it believes are worth over \$1 each (rather than their current \$0.50 market price). To obtain funding the loan will need to be secured against some collateral. There is a range of ways in which this could be achieved. They include obtaining a margin loan from the IB to buy XYZ shares, using a “repo” (a repurchase agreement which involves selling the ABC shares it owns and simultaneously agreeing to buy them back at some future date at a pre-agreed price), or lending its ABC shares to the IB and receiving cash collateral in return.<sup>2</sup>

Each approach will require that the value of the security provided by HF exceeds the \$100 cash which it wants to receive, but to keep matters simple we assume that it can get \$100 cash by pledging \$100 of ABC shares. (And to keep the story simple, we’ll assume that the interest rate is zero). The accounting representation of some of these transactions also gets pretty tricky<sup>3</sup>, so for simplicity, assume that the transaction is a simple loan from IB to HF secured by a charge over the ABC shares. (Players of the Monopoly board game will recognize the notion of mortgaging or pledging some asset to receive cash). The simplified financial accounts now are as follows.

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<sup>2</sup> Blundell-Wignall (2007) discusses the role of margin lending and repurchase agreements as mechanisms for hedge funds to obtain short term loans from the investment banks who act as their prime brokers. Securities lending as a form of raising funds, sometimes referred to as “equity financing” (described in ANZ, 2008), in which the cash received is less than the value of securities lent as collateral, was marketed in Australia as a form of margin lending by the securities firm Opes Prime with disastrous consequences for many involved. Margin lending in Australia grew from \$9.2 billion in March 2002 to a peak of \$36.2 billion in June 2007, before collapsing with the onset of the GFC to \$18.7 billion in March 2009.

<sup>3</sup> King (2008) provides an overview of investment bank accounting treatment of items such as repos, short sales, securities loans etc. See also Adrian and Shin (2009).

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<b>Hedge fund</b>		<b>Investment Bank</b>		<b>Pension Fund</b>	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
ABC* \$100	NW \$100	Cash \$0	NW \$150	XYZ* \$100	NW \$100
Cash \$100	Debt** \$100	XYZ* \$50			
		Loan** \$100			
		* 100 shares		* 200 shares	
* mortgaged	** to IB	** to HF			

The HF then uses the \$100 cash to place an order for 100 XYZ shares at a price of \$1 each, which drives their market price up to \$1 and which induces the PF to sell 100 of its 200 shares for \$1 each to the HF. Because the market price of XYZ is now \$1 per share, the PF will revalue (mark to market) its remaining 100 shares to \$1 each. Its net worth (members' accounts) is now \$200 (the \$100 cash received and its 100 remaining XYZ shares now valued at \$1 each). And the IB will also revalue its 100 XYZ shares and net worth. The simplified financial accounts now are as follows.

<b>Hedge fund</b>		<b>Investment Bank</b>		<b>Pension Fund</b>	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
ABC* \$100	NW \$100	Cash \$0	NW \$200	XYZ* \$100	NW \$200
XYZ# \$100	Debt** \$100	XYZ* \$100		Cash \$100	
		Loan** \$100			
* mortgaged	** to IB	* 100 shares		* 100 shares	
# 100 shares		** to HF			

A couple of points are worth noting at this stage. There has been no involvement of the commercial banking sector – other than recording the change in ownership of the \$100 deposit (cash) being transferred from the IB to the HF and then to the PF. Investors in the IB will feel happy because the market value of their shares will increase to reflect the increased net worth, as will the pension fund members whose account statements will reflect the capital gains made and increase in their net worth. But the management of the IB might be a bit concerned that it now has no liquid assets in the form of cash – which it may need for risk management purposes for a range of reasons (in a more realistic depiction of its complex range of activities).

Luckily (or maybe not, given some of the eventual possible consequences), there are a couple of solutions to the IB's lack of liquidity. One is that it might actually regard

the loan to the HF as being a liquid investment. It may be able to demand repayment by the hedge fund at any time (which, of course, would require the HF to either sell some assets or raise the cash by some other means). Alternatively, it may be able to borrow cash itself. And, of course, it has XYZ shares, now worth \$100 which it can provide as collateral for such loans, or equivalently “sell” to raise cash by way of a repo. (In that regard, King (2008) notes that in September 2008, over 50 per cent of US investment bank funding of assets was by way of repos).

So, simplifying again, assume that the IB pledges its XYZ shares as security against a \$100 loan from the pension fund, the outcome is as follows.

<b>Hedge fund</b>		<b>Investment Bank</b>		<b>Pension Fund</b>	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
ABC* \$100	NW \$100	Cash \$ 100	NW \$200	XYZ* \$100	NW \$200
XYZ# \$100	Debt** \$100	XYZ* \$ 100	Debt# \$100	Loan** \$100	
		Loan** \$100			
* mortgaged	** to IB	*mortgaged	# to PF	* 100 shares	
# 100 shares		** to HF		** to IB	

Now, the investment bank has restored its liquidity to \$100 and while the structure of its balance sheet has changed (involving more leverage) it may be happy with that situation, particularly given its higher net worth and perception that the loan to the HF is also a liquid callable asset.<sup>4</sup> The pension fund has a changed asset mix (and higher net worth) involving some credit risk (the loan to IB) although that credit risk is moderated by being secured against XYZ shares. (It might even perceive its prudential position as being essentially unchanged, from initially holding 200 XYZ shares, since it now owns 100 XYZ shares and has granted a loan secured by another 100 XYZ shares). The HF has no liquid assets, but its assets are the shares in ABC and XYZ the latter of which (not be pledged against a loan) can be sold on the market. That involves a risk, in that a demand by its investors for redemptions of cash or a demand by the IB for repayment of the loan might require it to sell its shareholdings in the market at a loss. But in a booming equity market that may not be seen to be a risk of great concern.

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<sup>4</sup> Adrian and Shin (2009) argue that US investment bank leverage has been pro-cyclical, with increases in asset values leading to increased leverage using secured short-term borrowings, similar to this example.

The HF's willingness to pay \$1 a share for XYZ has been the cause of the increase in both the XYZ share price and the increase in mark to market net wealth for the IB and the PF who were initially holding these shares at the then market price of \$0.50.

#### 4. *Some Observations*

Note that there has been no obvious upward pressure on interest rates, or on the scale of the commercial banking sector's activities or its demand for liquidity.<sup>5</sup> The boom in asset prices and perceived (mark to market) wealth has occurred without having any immediate implications for monetary policy and the Central Bank. The indirect implications come from the fact that companies like XYZ will find it easier to raise equity capital (due to a higher share price) to finance investment activities, and PF members may feel wealthier and increase their consumption expenditures (or feel more comfortable borrowing from banks to purchase investment properties etc).

Note also, that while the preceding analysis does not explicitly explain the dramatic decline in credit spreads (the excess of yields on corporate and asset backed bonds over government debt) in the years leading up to the sub-prime crisis, it is quite consistent with it. Simply substitute bonds issued by XYZ company for XYZ shares in the analysis – an increase in the price of the bonds is equivalent to a decline in credit spreads. Similarly, the analysis could be reworked to explain a commercial property price boom, by substituting property for XYZ shares.

#### 5. *Asset Price Deflation and Financial Collapse*

It may be that the HF's optimism is justified and that XYZ shares are worth much more than \$1. But it may also be a case of excessive optimism, and XYZ shares are, in fact worth only \$0.50. What happens if the market perception suddenly changes to that view?

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<sup>5</sup> The process may, of course, have been partly initiated by the banking sector doing such things as lending to individuals to finance their initial hedge fund investments. Also, a different scenario might involve the hedge fund borrowing from a commercial bank, generating similar outcomes to those depicted here but with an accompanying expansion in bank deposits.

Suppose, for example that some of the investors in the HF decide that this is the case and decide to withdraw funds. The HF can't sell its ABC shares to raise cash (because they are pledged against its loan from the IB and the proceeds would have to be used to repay that loan, or may have been sold to the IB in a repo). It tries to sell some XYZ shares in the market place and the price begins to fall. Note that the pension fund will also start to be concerned that its loan to the IB which is secured against XYZ shares is less secure (since the collateral has fallen in value) and may call its loan or require the IB to provide additional collateral. This forces the IB to sell its XYZ shares or to call its loan from the HF, in turn forcing it to sell more XYZ or ABC shares.

The precise path and eventual outcome of this downward spiral depends on many factors, but one possible outcome could be as shown below.<sup>6</sup> This assumes that the XYZ share price drops directly to \$0.50 and the ABC share price stays at \$1. In this specific case, the HF has sold its 100 XYZ shares into the market for \$50, has sold another 50 ABC shares for \$50, which together generate \$100 for it to repay its loan to IB and which it in turn uses to repay the loan from the PF. The \$100 cash received by the PF from repayment of the loan was used by it to buy the 50 ABC and 100 XYZ shares being sold by the HF.

<b>Hedge fund</b>		<b>Investment Bank</b>		<b>Pension Fund</b>	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
ABC \$50	NW \$50	Cash \$100	NW \$150	XYZ \$100	NW \$150
		XYZ \$50		ABC \$50	

6. *The Outcome: Who won, who lost?*

So, where has the money gone? Actually, it wasn't money, but rather paper wealth which had been created by the increase in share (or other asset) prices based on

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<sup>6</sup> Brunnermeier (2009) provides an outline of the feedback links between liquidity and asset prices which have become increasingly important due to the financial innovations such as discussed here. He identifies a cumulative process involving a loss spiral and a margin spiral, in which declining asset values mean that increased margin requirements for levered investors necessitate raising cash and that doing so by asset sales generates losses and further depresses asset values.

the perceptions of some market participants that the securities (and underlying businesses or real assets) were worth more. When perceptions changed, the paper wealth disappears.

Does this matter for the economy? Yes – because the changing share prices will alter the cost of raising new equity finance for companies. And some, perhaps XYZ may have been able to use the fact that their share price was high during the boom to borrow from the commercial banks to undertake physical investment (or take over other companies or buy assets perhaps at inflated prices). When the perceptions on which the boom disappear, those companies find themselves excessively leveraged and without adequate cash flows (or sufficiently valuable assets to sell to raise cash) to meet debt repayments. Likewise, individuals will have experienced changes in their perceived wealth which leads them to change their expenditure plans. Financial institutions facing a liquidity squeeze may also cut back lending with adverse effects for economic activity.

Who has won and who has lost? It depends on what the benchmark is. Compared to the peak of the boom, when XYZ shares were \$1, everyone has lost (although we may have all been fooling ourselves about our actual wealth). But compared to the start of the boom, when XYZ shares were \$0.50, some have gained and some have lost. In the example, the HF investors have lost \$50, the IB shareholders come out square, and the PF members are \$50 better off.

Those that lose are those that pay too much for assets and particularly if they borrow to do so. The lenders who make loans that turn out to be inadequately secured are also likely to be losers. The disruption to the financial system and the real economy from the unwinding of the intertwined positions also mean that we are all losers from this process.

#### 7. *Possible Lessons and Policy Implications*

What lessons should we take from this example? First, we have seen that the expansion (and subsequent contraction) of financial activity (in this simplified example) has occurred without any involvement of the banking sector and the Central Bank. Monetary policy targeted at the official cash rate (for inter-bank lending) and responding only to “real sector” developments such as inflation, would not respond directly to these financial shenanigans. And perhaps it shouldn’t, because it is difficult to determine

whether the expansion of financing is soundly based or not until after the event. But perhaps it should, because the consequences of an unsound expansion can be so undesirable – and history has taught us that financial systems are inherently susceptible to instability.<sup>7</sup> There is already a growing acceptance of the view that Central Banks need to expand their watching brief to include both asset price inflation as well as goods price inflation in setting monetary policy.<sup>8</sup>

Of course, Central Banks in recent past years have focused on using only one macro economic policy weapon – variations in an official short term interest rate achieved by operations in government bond markets (using outright sales and purchases and repos). But during the recent crisis, the range of securities accepted in repo transactions has been expanded to include private sector securities such as residential mortgage backed securities (RMBS).<sup>9</sup> While important for effectively achieving system wide liquidity management and assisting individual institutions with specific liquidity difficulties (about which more later), that does not really widen the range of macro-policy weapons.

Hence, debate has already started about how “macro-prudential” policy should be implemented – in which the parameters of prudential regulation are changed from time to time to achieve macro-economic goals.<sup>10</sup> Specifically, changes in the required capital ratios of banks could be altered (or risk weights for particular assets altered) to induce banks to contract or expand lending activity. To the extent that it is capital positions rather than liquidity positions which are the more immediate binding constraint on bank portfolio decision making, this approach may be more efficacious. Of course, its implementation also raises questions about the viability of maintaining a prudential regulator separate from the Central Bank.

The simple example used earlier did not have the banking sector playing a role in the financial expansion whereas in reality it is a key player in the development of

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<sup>7</sup> Reinhart and Rogoff (2008) provide an overview and analysis of financial crisis over the past two centuries. Allen and Carletti (2008) includes a review of some of the developments in theoretical analysis implying the potential for instability in financial systems where financial institutions and markets create liquidity.

<sup>8</sup> See for example, Brunnermeier et al (2008) who argue for adoption of macro-prudential policy to “lean against” asset price bubbles.

<sup>9</sup> Debelle (2008) provides an outline of RBA open market practices.

<sup>10</sup> See for example Turner (2009).

financial booms through its expansion of lending and credit. Central Bank actions to reduce liquidity of the banking sector will flow through to the third (largely unregulated) layer of the finance sector depicted in Figure 1.

But it has to be asked whether in the modern financial system, relying on system wide liquidity management to affect the official cash rate directly and thus indirectly influence finance sector activity has the “bang per buck” or reliability that is needed for adequate macroeconomic control. The example used above illustrated that modern financial technology has developed various ways in which liquidity can be created by use of secured (collateralized) short term lending based on well developed markets in the assets used as collateral. Yes, it is true that the liquidity creation is something of a zero sum game between participants and certainly “in the eye of the beholder”. It requires the short term loan provider (or securities borrower or repo participant) to regard their extension of credit to a counterparty as being immediately available for cash if required and as good as having cash on the balance sheet – because the collateral provided can be easily sold. But the whole structure can go horribly pear-shaped if confidence dissolves and institutions face both a “funding liquidity” and an “asset liquidity” problem.<sup>11</sup> While, ultimately, the superstructure of “inside liquidity” created by the financial sector is founded (like the inverted pyramid) on “external liquidity” (base money) provided by the Central Bank, the quantitative and price linkages between them may be unstable and reliable.

This raises the complex question of what, if any, regulation and oversight is required over the third tier of financial institutions in the pyramid – whose leveraging and liquidity creation fanned the fires of asset price inflation in the simple example used earlier, and played a large role in our actual experience, particularly in international markets. What set of regulatory arrangements will generate the best benefit-cost ratio, where benefits arise from the efficient financing occurring in normal times and costs arise from possible occasional “system failures”?

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<sup>11</sup> This is essentially the margin spiral and asset spiral described by Brunnermeier (2009) where falling asset prices mean that levered institutions face margin calls or difficulties in rolling over short term funding secured against assets (a funding liquidity problem) and are forced to sell assets into a declining market (an asset liquidity problem). As the recent experience has shown, it may be virtually impossible in a crisis situation to sell some types of assets (such as CDOs) without taking catastrophic losses.

One argument sure to be advanced is that if Central Banks bring asset market inflation into their targeting and possibly implement macro-prudential policy policies, that may be sufficient. In this view, credible policies which raise the costs of funding whenever over-optimism in the markets threatens asset price stability (however that might be defined) obviate the need for an expansion of regulation. But whether the link between the instruments available to the Central Bank and the targets of policy is reliable enough is currently an unanswered question.

In considering this question of possible regulation, it is important to bear in mind the distinction between prudential regulation and regulation related to systemic concerns. The former is aimed at ensuring selected financial institutions are, by and large, capable of meeting their promises to counterparties and is based on two premises. The first is the perceived significance of the reliability of those promises for the smooth operation of the financial system. The second is the perceived difficulties counterparties have in assessing the reliability of the promise. Hence, in Australia, for example, prudential regulation is applied to banks and other ADIs, insurers and superannuation funds and the focus is on ensuring prudential behavior for the protection of depositors, policy holders, and superannuation fund members. But these institutions also have a wide range of transactions with other counterparties in wholesale financial markets. While protection of those counterparties is not a specific aim of prudential regulation, the existence of a complex web of interrelationships means that concerns about the possible ramifications of failure of a non-regulated entity on the stability of the financial system also become important.

Despite that, there is general consensus that prudential regulation should only apply to a limited section of the financial system, such that there should be available a range of financial institutions spanning the complete risk spectrum so as to provide the full range of financial services required in a modern economy. Those wishing to deal with non-prudentially regulated institutions should be allowed to do so on a *caveat emptor* basis.

Consequently, should hedge funds, investment banks, finance companies etc be prudentially regulated? No – although two problems need to be addressed.

First, how can policy makers ensure that customers dealing with those institutions are suitably informed and aware of the risks involved? Unfortunately, current approaches relying on disclosure, education and advice do not seem to work well. In Australia, ASIC has introduced new “if not – why not” disclosure requirements for non-prudentially-regulated finance companies issuing debentures which is aimed at improving investor protection, while maintaining a *caveat emptor* approach. It remains to be seen how effective such an approach will be.

Second, the activities of prudentially regulated institutions overlap and involve competition with those of the non-prudentially regulated. In those areas of activity, there are important questions of whether the costs and benefits of prudential regulation affect the competitive balance. Whether enforced separation of institutions into separate sections involving prudentially regulated activities and non-prudentially regulated activities is feasible, achieves competitive neutrality, and prevents risk spillovers between the two sections, are important questions.

Consequently, should hedge funds, investment banks, finance companies etc be regulated in some way on grounds related to system stability? Perhaps not as institutions *per se*, but there are undoubtedly some activities they undertake, and inter-linkages between them, which have significant implications for the overall smooth functioning of the financial system, and which may warrant attention. The G20 (2009) has already indicated that registration, greater provision of information to regulators, and oversight of risk management systems are to be required of large hedge funds in the future.<sup>12</sup> Moreover combining several different types of activities within the one organization exposes counterparties of all those activities to loss due to the failure of the institution from some subset of activities, and increases the risk of institutions becoming too systemically important to be allowed to fail. The combining of proprietary trading with securities markets business by investment banks, and writing of credit insurance by general insurance companies are two recent examples highlighted by the financial crisis and US government bail-out responses in the case of Bear-Sterns (but not Lehman Brothers) and AIG.

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<sup>12</sup> Similarly, proposals are emerging for having Central Clearing Counterparties involved in over-the-counter derivatives markets such that market wide counterparty exposures will be less complex and more transparent to both regulators and market participants.

While this suggests that there may be some case for requiring some forms of structural separation of significant non-bank institutions, this is a debate waiting to happen. So also is the full recognition of the potential social costs from development of financial behemoths which dominate the financial sector, become “too big to fail” and thus enjoy implicit government support. As Allan Meltzer (2009) has recently commented “If banks are “too big to fail,” the government should force them to become smaller” – unless, of course, correctly valued levies for the implied government protection can be charged.

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