

SHADOW BANKING AND FINANCIAL INSTABILITY

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In autumn 2008 the developed world's banking system suffered a severe crisis. In response the world's regulators and central banks have focused on building a more stable banking system for the future: less leveraged, more liquid, better supervised and with even the largest banks able to be resolved without taxpayer's support. The implementation of that bank focused regulatory agenda is still unfinished, but much progress has been made.

Looking back to the year 2007-08, however, it's striking that the crisis did not at first look like a traditional banking crisis, but rather one related to a new phenomenon: shadow banking. Initially the problems seemed concentrated in the US, where the development of non-bank credit intermediation was most advanced, and many of the events which marked the developing crisis related to non-bank institutions and markets (**Exhibit 1**).

- In June 2007, liquidity pressures at two hedge funds sponsored by Bear Stearns Asset Management, leading to the imposition of gates on investor redemptions, sudden increases in margin calls, and sudden falls in asset prices.
- In August, major losses at hedge funds which the market had thought were following low-risk market-neutral strategies, as a result of knock-on consequences from margin calls in structured credit portfolios.

- The closure in February 2008 of hedge funds Carlyle Capital and Peloton in the face of additional collateral calls on mortgage backed securities.
- Gradually growing problems throughout 2007 to 2008 in the liquidity and solvency position of off-balance sheets structured investment vehicles (SIVs) and conduits which had taken leveraged positions in structured credit products, and had funded those with liabilities far shorter than the contractual maturity of the assets, many of these liabilities (ABCP) bought in turn by money market mutual funds.
- The rescue of Bear Stearns in March 2008 and the failure of Lehman Brothers in September, the latter the key trigger for the dramatic intensification of the crisis. Both of them broker dealers/investment banks rather than commercial banks.
- The emergence in Summer 2008 of major stresses among money market mutual funds, which had previously seemed to promise investors an attractive combination of enhanced return, immediate fund access, and capital certainty, with Reserve Primary Fund 'breaking the buck' on 16 September 2008.
- The development between August to October 2008, of a new form of liquidity run: a run as much in the secured lending markets (such as repo) as in unsecured funding.
- And, throughout late autumn 2008, significant deleveraging by hedge funds, whose sales of credit securities into a falling market helped drive a downward spiral of trading book asset values, which in turn undermined confidence in the solvency of major banks.

So we need to ensure the regulatory response appropriately covers shadow banking as well as banks. The Financial Stability Board has therefore committed to the G20 that by the end of this year we will produce both a comprehensive analysis of the risks created by shadow banking and a package of proposed regulatory responses; and last year we published

documents defining shadow banking¹, attempting to measure its size, and setting out an array of possible policy responses.

But the task is challenging. And the difficulty starts with definition – what exactly is shadow banking and how exactly did it contribute to financial instability.

- Numerous studies, academic, and official, have attempted to estimate the “size of the shadow banking sector”, but with significant variation in the estimates (**Exhibit 2**). Pozsar, Adrian, Ashcraft and Boesky, in a major study for the NY Fed in July 2010, suggested a total size of \$20 trillion for the US in 2008, but Pozsar and Singh argued that another \$5 trillion should be added, to reflect the role of collateral rehypothecation.² Bouveret estimates the size of the European shadow banking system at \$13 trillion,³ but the FSB’s October 2011 report suggested that a wide definition based on the balance sheets of “Other Financial Institutions” could imply as much as \$22 trillion.
- And a large and very valuable academic literature on shadow banking has developed to which I will refer later – but with different judgements about the essential factors at work, and therefore about the degree and the nature of radicalism required in response. (**Exhibit 3**).

¹ Shadow Banking: Strengthening Oversight and Regulation: “*Financial Stability Board*”, October 2011.

² Zoltan Pozsar and Manmohan Singh: “*The Nonbank-Bank Nexus and the Shadow Banking System*”, IMF Working Paper 289, December 2011.

³ Antoine Bouveret: “*An assessment of the Shadow Banking Sector in Europe*”, July 2011, European Securities and Market Authority.

- To Gary Gorton and Andrew Metrick the fundamental problem lay in the procyclicality of the repo market, but other academics have questioned this assumption.⁴
- To Zoltan Pozsar and Manmohan Singh, one of the most fundamental forces at work was increasing institutional investor demand for short-term liquid instruments, but the precise importance of that development remains unclear.⁵

So my aim today is to review what we know about shadow banking, how we best define it and to consider the range of possible policy responses.

And I will reach three main conclusions.

- First, that we need to understand shadow banking not as something parallel to and separate from the core banking system, but deeply intertwined with it.
- Second, that the way in which shadow banking contributed to financial instability reflected fundamental developments in our financial system which are relevant to banks as much as to shadow banks, which remain important today, and which could produce new problems in the future.

⁴ Gary Gorton and Andrew Metrick: “*Securitized Banking and the Run of Repo*”, NBER Working Paper No 15223, August 2009.

“*Haircuts*”, May 2010.

“*Regulating the Shadow Banking System*”, Brookings Papers on Economic Activity, Fall 2010.

See also however Adam Copeland, Antoine Martin and Michael Walker: “*Repo Runs: Evidence for the Tri-Party Repo Market*”, FRB NY Staff, Report No 506, July 2011, which finds less evidence of a repo run in the tri-party repot market than Gorton and Metrick observed in bilateral repo.

⁵ Zoltan Pozsar: “*Institutional Cash Pools and the Triffin Dilemma of the US Banking System*”, IMF Working Paper, August 2011.

Manmohan Singh and James Aitkin: “*The (Sizeable) Role of Rehypothecation in the Shadow Banking System*”, IMF Working Paper, July 2010.

Manmohan Singh: “*Velocity of Pledged Collateral, Analysis and Implications*”, IMF Working Paper, November 2011.

- Third, that as a result we should not take the decline in some specific indicators of shadow activity which has occurred since 2008, as suggesting that the risks have gone away.

1. **Shadow banking activities: definitions, origins and size**

Let me begin with the definition. The FSB has defined shadow banking as entailing “credit intermediation which occurs outside or partially outside the banking system, but which involves leverage and maturity transformation”. That definition reflects the following logic (**Exhibit 4a**).

- The financial system intermediates flows of finance between non-financial providers of funds – typically households and corporates – and users of funds – typically households, corporates and governments. These flows can be in debt form (loans, bonds, or other credit securities) or in equity form, or in various hybrids of the two.
- A key role within this financial intermediation system is performed by fractional reserve banks (**Exhibit 4b**), which take deposits from households and corporates, and lend money to households, corporates and sometimes to governments. These banks are both leveraged – their debt liabilities a high multiple of their equity – and maturity transforming – their liabilities much shorter term than their assets.
- But many financial flows occur outside banks and have always done (**Exhibit 4c**). These include equity flows which can go direct from households to corporates, or via intermediating institutions such as insurance companies or investment funds. And they can include non-bank credit intermediation – the direct purchase or the intermediated purchase of government or

corporate bonds. These flows are all forms of non-bank financial intermediation, but we don't label them shadow banking if, as is often the case, they do not involve the distinctive features of banking – leverage and maturity transformation – the distinctive features which create distinctive risks.

- “Shadow banking” occurs when we have credit flows outside or partially outside the banking system which do involve these distinctive features (**Exhibit 4d**). This is the case when, for instance, a money market mutual fund lends money to an asset backed commercial paper SIV, which buys the tranching debt issued by a special purpose vehicle – a chain of intermediation which is functionally equivalent to banking, and which introduces both leverage and maturity transformation, but in multiple steps, rather than within one bank balance sheet.
- This “shadow banking” could, at least theoretically, exist as a standalone system parallel to but quite separate from banking. But in practice it didn't; rather the shadow banking system which actually developed involved complex interconnections between the banking system and shadow banks (**Exhibit 4e**).
 - With money market mutual funds (MMMFs) funding banks as well as funding ABCP conduits.
 - ABCP conduits and SIVs sponsored by banks.
 - And the loans which went into securities often, but not always, originated by banks or by bank-owned subsidiaries.
 - And with an extremely complex web of short-term secured funding markets – such as repo or prime broker finance – linking money market mutual funds, banks, investment bank

broker dealers, hedge funds and asset managers seeking to earn additional return via securities lending.

The shadow banking system is therefore essentially a set of activities, markets and contracts, as well as institutions; and the institutions are linked together via myriad multi-step chains. And it is a very complex system, as Exhibit 5, taken from the Federal Reserve Bank of New York's July 2010 report illustrates.

Which is why measures of "the size of the shadow banking" system are not only varied but also not all that useful – because it is the nature of a complex interconnected system that any measures of its size depends crucially on the counting system used. Do we aggregate all values at all the links along the chain, or only at the end point connections to the non-financial real economy? And do we consider inter-institution links on a net or gross basis? The answer is that we have to measure it in different ways to answer different questions.

- Aggregate gross values matter because each link in the chain can create potential risk.
- But net claims to and from the non-financial sector matter if we are seeking to identify how much non-bank credit is extended, and how much non-bank near-money has been created.

And it is clear that on many different measures "shadow banking" activities grew dramatically in the US over the 30 or so years before the crisis – a growth we can track by looking at the asset side of the financial system, at its liability side, and at its internal interconnections.

- On the asset side, lending to the non-financial real economy was increasingly in securitised form – the share of mortgages which stayed on bank balance sheets falling from 80% to 35% between 1980 and 2008 and overall volumes of securitised credit growing from 6% of GDP to 50%, (**Exhibit 6**). This securitised credit, in

addition, took an increasingly complex structured form – tranching into different slices of credit worthiness, with the alchemy of structuring apparently creating AAA securities out of lower credit quality loans.

- On the liability side, households and corporates from 1980 onwards placed an increasing share of short-term savings in money market mutual funds, and a decreasing share in plain old fashioned bank deposits (**Exhibit 7**).
- While within the financial system itself we saw a proliferation of intra-financial system contracts, with the investment bank broker dealers growing far faster than commercial banks (**Exhibit 8**) with Asset Backed Commercial Paper values growing rapidly (**Exhibit 9**) and with repo and other secured lending markets growing in importance (**Exhibit 10**).
- Overall as a result, non-bank financial sector assets have grown rapidly as a % of GDP, even as bank balance sheets have also grown, but more gradually (**Exhibit 11**). A set of developments which alongside more complex links between banks themselves, drove a dramatic increase in the aggregate value of intra-financial system assets and liabilities, relatively to those which linked the financial system outward to the real economy (**Exhibit 12**).

So credit was extended in non-bank form; short-term corporate and household financial assets – money equivalents – were held in non-bank form, and the credit intermediation system became massively more complex.

Why did these developments occur?

Well, in part for some fundamental and globally relevant reasons to which I will return later; but in part, because of three factors specific to US market structure and regulation (**Exhibit 13**).

- Specific features of the US residential mortgage market which combined a commitment to provide 30-year fixed rate but repayable mortgages and the peculiar part public/part private role of the government sponsored enterprises – Fannie Mae and Freddie Mac. Together these created conditions peculiarly conducive to the growth of a securitised rather than on-balance sheet mortgage system.
- The existence until the mid 1980s of Reg Q limitations on bank deposit interest rates, which gave the money market mutual funds a huge initial regulatory advantage.
- And the development of US financial regulation, which combined a dismantling of the Glass-Steagall separation between commercial and investment banking with a continued light touch regulation of the investment bank broker-dealers, a combination which enabled them to grow leverage far faster than the commercial banks, and which left them free to morph from non-systemic broker intermediaries to massively important and massively systemic principals.

These three specific US features were largely absent in the European context, and as a result, the European development of non-bank intermediation was both more limited and different.

- With a later and more limited growth of residential mortgage securitisation – most European mortgages continuing even at the pre-crisis peak to be held on balance sheet (**Exhibit 14**).
- A more limited and somewhat different role for money market mutual funds (**Exhibit 15**).
- And a much greater role of bank balance sheets in European credit intermediation (**Exhibit 16**). Eurozone deposit taker balance

sheets still today aggregating to 350% of GDP, while US banks amount to about 100% of American national income. And conversely, measures of total shadow banking activity – very imperfectly captured by looking at the size of “Other Financial Institutions” – amounting to 210% GDP in the eurozone, but a much higher 330% in US.

And it is indeed important to be clear that much of the financial crisis in Europe did not involve shadow banking activities such as securitised lending, but plain old fashioned on-balance sheet lending. Unlike in the US, losses on securitised mortgage lending in Europe have been relatively minor (**Exhibit 17**), with a bigger hit to bank balance sheets arising from commercial real estate loans – in particular in the UK, Ireland and Spain – primarily lent in the traditional fashion by traditional banks.

But these differences did not insulate the European banking system from shadow banking losses and risks, for key parts of the European banking system were involved in the shadow bank intermediation of credit flow from US savers to US borrowers.

- London acting as a major centre for the trading and risk management of structured credit and derivatives relating to securitised credit extension to US borrowers.
- Major European banks such as UBS, Deutsche, BNP, RBS and Barclays involved quite as much as Citi, Goldman Sachs or Morgan Stanley in the complex intra-financial links of the system, either out of their London or New York operations.
- And large European banks, such as the German Landesbanks, playing a role as major buyers of US structured credit. This role in part derived from the fundamentals of current account imbalance – if Germany runs a current account surplus, its excess savings must

end up as a claim against some category of equity or credit elsewhere in the world. But it was swollen further by the fact that European banks were simultaneously large receivers of short-term dollar funding from US money market funds, and large investors in US securitised credit, conducting therefore leveraged and maturity transforming credit intermediation between US investors and US borrowers but via a European bank balance sheet. A phenomenon which illustrates the point made by Borio and Disyatat in their recent analysis of “Global imbalances and the financial crisis” – that we need to understand the pattern and implications of gross capital flows as much as the net flows which match current account imbalances.⁶

So shadow banking has to be understood as involving both in some cases new forms of non-bank interaction between the financial system and the real economy, and as entailing far more complex links within the financial system itself, including between banks and non-bank institutions. And both the financial system to real economy links and the intra-financial system relationships were crucial to the origins of the crisis.

- The crisis was triggered by high levels of losses in US sub-prime residential mortgage lending. These losses were much higher than those suffered on mortgage lending in Europe, where most of the lending was on balance sheet (**Exhibit 18**). This reflected the fact that the multi-step originate and distribute model of credit extension which dominated in the US reduced the incentives of agents at each step of the chain to perform adequate credit analysis – driving as a result a severe decline in underwriting standards.

⁶ Claudio Borio and Piti Disyatat “*Global imbalances and the financial crisis: link or no link?*” BIS Working Paper No 346, May 2011.

- But the scale of the crisis was also hugely magnified by the complexity, multi-step nature and opacity of the intra-financial system claims. As Hyun Shin and others have pointed out, while US sub-prime losses eventually incurred were large, as a % of US total capital market values they were not massive,⁷ and few financial experts in 2007 if they had known the figures in advance, would have predicted that sub-prime losses could be the trigger for a huge financial crisis.
- And while large credit losses arising from poor underwriting help explain why securitised lending collapsed in the US, triggering a credit crunch as a result, they do not explain the equally large fall in securitised lending to the UK mortgage market (**Exhibit 19**). Losses in the UK mortgage market have been far lower than in the US, and far lower than in the 1990s recession – almost all senior tranches of UK RMBS are forecast to pay out in full. But UK securitised lending collapsed as dramatically as US, not because of credit losses incurred, but because of the dramatic shrinkage of the investor base of leveraged and maturity transforming vehicles such as SIVs and ABCP conduits. UK RMBS had been to a significant extent funded through a multi-step chain of intermediation at the source of which sometimes lay US households, corporates or institutions holding what they thought were short-term zero risk money-equivalent investments in US money market funds.

Effective shadow banking policy reforms must therefore address both:

⁷ For instance, total mark-to-market losses on structured credit and high yield securities in addition to loan write-downs, estimated by the IMF at \$1405bn in October 2008, amounted to 6% of related securities and loans, and 2.6% of total credit extended in the US economy.

- The features of shadow banking which undermined incentives to good credit underwriting and which therefore enabled unsafe over-leveraging in the real economy.
- And the features of the total financial system which magnified the impact of the initial real economy credit problems.

To address the second point we need to understand the essential drivers of financial stability in today's complex interconnected system.

2. What has happened to shadow banking: has it gone away?

But before turning to those essential drivers, let's just check: Do we need to worry about shadow banking any longer? Or has it already gone away or at least become less risky? The answer is that on some measures shadow banking is now a shadow of its former self.

- As already shown, extension of securitised credit has collapsed, down 90% from peak to trough in the US and 95% in Europe. In the US, the mortgage market has become even more dominated by the GSEs; in the UK, non-bank origination has almost disappeared. Remaining mortgage securitisation across Europe, meanwhile, is largely focused on the creation of retained securities for use as collateral for central bank funding, rather than for distribution to end investors (**Exhibit 20**). And covered bonds have emerged as the preferred form of secured funding against mortgage loans – claims against both the mortgage assets and the bank balance sheet.
- This collapse in new securitised mortgage lending has inevitably also been matched by a drastically reduced role for the ABCP

conduits and SIVs which previously funded new mortgage and other credit extension (**Exhibit 21**).

- Money market funds meanwhile have shrunk slightly (**Exhibit 22**), and have shifted their asset allocation away from the riskier forms of shadow bank credit intermediation. This has been in response to tighter regulation; and has been matched by some return of US household savers to classic bank deposits, in part reflecting big increases in the level of deposit insurance.
- Investment bank balance sheets, meanwhile, have shrunk significantly, and leverage levels have substantially declined (**Exhibit 23**). And hedge funds which relied on the prime broker services of investment bankers for funding have also on average become less leveraged (**Exhibit 24**).

So one could argue that the risks from shadow banking activities have reduced. And certainly the decline along these several dimensions suggests that the immediate risks are smaller, allowing us time to think through the appropriate policies.

But we should not assume that the shadow bank type risks which contributed to the crisis have been permanently resolved, for three reasons:

- First, because one of the key reasons why the system has shrunk is simply that credit demand and supply have fallen. And that reduction has been an important driver of depressed nominal demand and depressed growth. At some time the conditions for more robust credit demand growth will re-emerge, and may need to if economies are to recover.
- Second, because when that happens, there could be strong incentives for the growth of non-bank or partially non-bank credit

intermediation channels, precisely because we have significantly increased the capital and liquidity requirements by which we constrain leverage and maturity transformation in the formal banking sector.

- Third, because the growth of the activities which we labelled “shadow banking” was rooted in developments in the overall operation of our credit intermediation system – whether bank or non-bank – which continue to be important and to which we need to respond whether or not shadow banking re-emerges in the same precise form which grew up prior to 2008.

It is to these underlying fundamental drivers of financial instability that I will now turn.

3. Drivers of instability in the modern financial system

Analysis of the development of what we label “shadow banking” suggests five interrelated factors which make the modern financial system inherently unstable (**Exhibit 25**).

- The interaction of secured lending practices and mark-to-market accounting, which exacerbates the risk of procyclicality and the volatility of credit creation.
- The creation of long, complex intermediation chains, which can increase the dangers of funding runs, and which make it difficult for authorities to see the development of excessive maturity transformation.
- The important links between funding liquidity and market liquidity, which can increase contagion risk across apparently separate markets.

- Increasing demands for “liquidity” in asset holdings, and thus for cross-system maturity transformation, arising in part from practices and incentives within the asset management industry.
- And the danger that increasingly self-referential approaches to credit pricing, combined with inherently myopic and unstable assessment of tail risks can further increase procyclicality and instability.

These factors derive from the fact that the modern system of credit intermediation, involves a combination of and inter-relationship between banks and capital markets. But to understand the specific risks introduced by that combination, it is useful to start with the risks which exist even in a pure traditional banking system.

Banks, instability and public policy

Banks create private money (**Exhibit 26**): they can extend loans to borrowers who thereby gain bank deposits which can be used to make payments.⁸ Crucial to that money creation process is maturity transformation – the fact that the loan extended is of longer tenure than the deposit created; if the borrower had to pay back the loan immediately, the deposit money would of no effective use.

This money creation process is potentially unstable for two reasons:

- First, because maturity transformation is an inherently risky activity: if all the depositors want their money back simultaneously, they cannot have it. As a result, entirely free banking systems are susceptible to deposit runs which, as Douglas Diamond and Philip Dybvig illustrated in a classic article, can be entirely rational for the

⁸ See Adair Turner, “*Credit Creation and Social Optimality*”, Southampton University, August 2011.

individuals concerned, even if the bank is in some meaningful sense solvent.⁹

- Second, because the volume of credit extended and money created can be subject to strongly procyclical self-reinforcing cycles, (**Exhibit 27**) especially when credit is extended to buy assets which can go up in value such as residential or commercial real estate. More credit lent drives up asset prices; higher asset prices tend to mean lower losses on credit extended; bank thus have more equity capital to support further borrowing, and the behaviour of both lenders and borrowers is influenced by the assumption that the good times will continue, that asset prices will continue to rise and the loan losses will remain low... until some shock in confidence occurs and the factors all operate in reverse direction.

Because of these two features, entirely free banking systems – such as existed in the USA before the creation of the Federal Reserve in 1913 – were inherently unstable. Banking was made potentially stable by three public policy interventions:

- Prudential regulations which prescribed minimum required levels of equity capital and of liquid assets, thus limiting the extent of maturity transformation.
- Lender of last resort liquidity insurance provided by central banks.
- And deposit insurance schemes, which removed the incentive to run from at least the covered deposits.

In addition, in a further step to contain the potential instability of fractional reserve banking, we are now committed to the introduction of macro-

⁹ Douglas Diamond and Philip Dybvig: “*Bank Runs, Deposit Insurance and Liquidity*”, Journal of Political Economy 1983.

prudential tools – such as counter-cyclical capital buffers – which could deliberately lean against the power of the credit and asset price cycle. In the UK the use of the sub tools will be the responsibility of the new Financial Policy Committee.

Shadow banking: heightened risks

So banking is so inherently risky that we need powerful public policy interventions to make it stable. But these banking risks can be present and indeed can be even more severe in a shadow banking system, or in a system which involves inter-linkages between bank balance-sheets, shadow bank balance-sheets, and capital markets. That it is for three reasons:

(i) Secured lending, mark-to-market accounting, and procyclicality. First, because a system of overtly secured finance, combined with mark-to-market accounting, can hardwire the procyclicality shown on Exhibit 27. In the classic bank cycle there illustrated, the asset side of the bank balance-sheet (the loan) may be secured against the asset financed: but on the liability side (the deposits) there is no automatic link between funding availability and asset value (**Exhibit 28**). In a secured financing system, that link is created, with for instance (**Exhibit 29**) a money market fund providing finance to an intermediary via a repo contract within which the changing value of the collateral posted must always exceed the loan outstanding.

In such a system, as Hyun Shin and Tobias Adrian have argued, procyclicality is potentially hard wired through the haircuts or margins applied to the secured finance (**Exhibit 30**)¹⁰. When asset values fall,

¹⁰ Tobias Adrian and Hyun Song Shin: “*Money, Liquidity and Monetary Policy*”, FRBNY Staff Report No 360, January 2009.

“*Liquidity and Leverage*”, FRB NY Staff Report No 328, January 2009.

Hyun Song Shin: “*Financial Intermediation and the Post-Crisis System*”, BIS Working Paper No 304, March 2010.

and even if percentage haircuts or margins remain unchanged, more collateral must be posted, less finance is available, positions have to be liquidated to meet collateral calls, and further asset price reductions may result. In addition, heightened awareness of risks may lead to increased percentage haircuts being demanded. As a result, Hyun Shin and Tobais Adrian have argued, leverage in a secured finance based shadow banking system is even more procyclical than in commercial banks – a proposition for which they find empirical evidence (**Exhibit 31**).

And as a result, Gary Gorton and Andrew Metrick have argued, changes in required haircuts in the repo market in 2008 (**Exhibit 32**)¹¹ were among the most important drivers of the financial crisis – the crisis being best understood in their analysis as an ‘run on repo’ rather than as a run on traditional bank deposits. They therefore argue that to make the shadow banking system permanently more stable, will require us to extend to secured financing markets such as repo the disciplines of regulation, deposit insurance and/or restricted institutional charters which we have applied in the past to banks.

(ii) Long complex intermediation chains: non-transparent maturity transformation. That ‘run on repo’ was able to create havoc, because of maturity transformation arising outside bank balance sheets – the second fundamental driver of instability. Banks perform maturity transformation, enabling the non-financial real economy to hold short term assets but long term liabilities. That transformation can also be performed by a chain of shadow banking entities (**Exhibit 33**) with, for instance, a household or corporate holding an instantaneously available investment in a money market fund, which indirectly funds a long term mortgage. Essentially therefore, the shadow banking system can create forms of

¹¹ Gary Gorton and Andrew Metrick: “*Securitized Banking and the Run of Repo*”, NBER Working Paper No 15223, August 2009.
“*Haircuts*”, May 2010.
“*Regulating the Shadow Banking System*”, Brookings Papers on Economic Activity, Fall 2010.

‘private money’ held either by the non-financial real economy or by intermediate financial institutions, in a fashion analogous to the banking system’s own creation of deposit money. And wherever there is maturity transformation and private money creation, there is a potential for runs.

Before the crisis, this maturity transforming system was not fully separate from the banking system, but deeply interconnected with it – with banks themselves providing explicit or implicit liquidity insurance to shadow bank vehicles, such as SIVs and conduits. Clearly to make the banking system safe we will need to control the extent to which banks can provide such liquidity insurance to shadow banks. But to make the shadow banking system itself stable, academics such as Morgan Ricks and Gorton and Metrick argue that we will also need to extend to shadow banking activities and markets the same disciplines of regulation, lender of last resort, and deposit insurance, by which we have controlled maturity transformation risks in banks.¹²

(iii) Funding liquidity driving market liquidity, driving funding liquidity.

A third key driver of instability arises from the important linkages between market liquidity and funding liquidity which Marcus Brunnermeier and Lasse Pedersen have explored.¹³ ‘Market liquidity’ – in for instance a market for equities or bonds – is high if an investor is able to buy or sell in large quantity at a relatively low bid-offer spread: ‘funding liquidity’ refers to the ease with which buyers of assets – such as investors, speculators or market makers – can attract funding, which is typically advanced against the collateral value of the securities traded. As Brunnermeier and Pedersen illustrate, the two are closely linked, and linked to asset values (**Exhibit 34**). When asset prices fall, collateral values and the supply of secured funding may reduce even if haircuts remain stable: but reduced funding can drive diminished market liquidity and an increase in price

¹² Morgan Ricks: “*Shadow Banking and Financial Regulation*”, August 2010.

¹³ Marcus Brunnermeier, Lasse Heje Pedersen, “*Market Liquidity and Funding Liquidity*”, November 2008.

volatility, which may be reflected in increased percentage haircuts or margins, and in an increase in the capital which Value-at-risk (VAR) models suggest is required against trading activity. As a result, and particularly in a downswing, asset prices, the supply of secured finance, and market liquidity can all be linked in self-reinforcing cycles. In addition previously apparently uncorrelated markets can become correlated.

These three factors together – secured finance and mark-to-market accounting, long chain maturity transformation outside formal banks, and the links between market liquidity and funding liquidity – make financial systems which combine traditional banking and credit securities markets potentially very unstable.

And these factors will remain highly relevant to financial stability even if some measures of shadow banking authority have reduced in the way I illustrated earlier, since:

- Banks themselves increasingly raise finance in a secured form, encumbering their balance sheets with specific hypothecated claims from specific fund providers against specific assets.
- Banks themselves are continually seeking to raise finance via complex market based contracts – such as collateral swaps or synthetic ETFs – which expose them to the potential instability of funding liquidity.
- Banks themselves are in their trading activities, exposed to the procyclical links between funding liquidity and market liquidity which Brunnermeier and Pedersen highlight.

As Pozsar et al commented in their July 2010 analysis, *“it is therefore important to realise that the problem of inter-related market liquidity, funding liquidity and asset values is not simply an issue for the shadow banking system, but is a feature of any market based financial system where financial*

intermediaries' balance sheets are linked together with mark-to-market leverage constraints".

So we need to focus not just on whether shadow bank intermediation re-emerges in the forms we saw prior to the crisis, but on the fundamental drivers of instability across the whole financial system, banks or non-banks, drivers which may in the future produce a repetition of pre-crisis instability, but in changed specific forms.

The combination of mark-to-market accounting, secured funding and multi chain maturity transformation were thus key causes of shadow bank instability. But these in turn reflected still more fundamental factors – an increasing demand for risk free but liquid assets, and an inherent tendency of the financial system to generate more apparently low risk contracts than could safely and sustainably exist.

The demand for risk free liquid assets

Maturity transformation is a crucial function. It is welfare enhancing because it enables the non-financial real economy to finance projects with long term credit liabilities while holding short term financial assets: it should therefore facilitate long term investment. But it is inherently risky. So a key variable that regulators would ideally be able to measure is aggregate maturity transformation across the whole system: but in fact our estimates of it are highly imperfect.

But it is almost certainly the case that aggregate maturity transformation grew significantly in the several decades before the crisis, but without regulators or central banks noting that increase or the attendant risks. We know for instance that the last 30 years saw big increases in many countries in residential mortgage lending as a per cent of GDP (**Exhibit 35**) from 25% to 90% in the UK for instance, and we know that much of this mortgage credit has been financed not by a growth in long term debt holdings (for instance

pension funds buying residential mortgage securities and holding them to maturity) but by growth in short term bank deposits, or in the US by growth in equally short term MMMF investments. The total amount of maturity transformation which the financial system performs has therefore increased significantly relative to national income.

But equally importantly, as Zoltan Pozsar has pointed out, there has also been a change in who holds short term financial assets and in how they hold them.¹⁴ In particular there have been quite dramatic increases in cash or cash equivalent assets held by corporations (**Exhibit 36**), and by financial intermediaries such as pension funds, insurance companies and mutual funds (**Exhibit 37**). The drivers of these large non-household savings of liquid assets are imperfectly understood, but on the financial institution side, Pozsar and Singh suggest two explanations.

- First, the desire to hold some assets in liquid form to maintain the investment flexibility needed to meet short term asset management mandates – performance versus defined benchmarks measured on a quarterly basis. This desire generates what Pozsar labels “reverse maturity transformation” – as institutions which have long term liabilities to the non-financial economy (e.g., liabilities to provide pensions to households) keep a significant and growing proportion of their assets in short term form.
- And second, a by-product of securities lending programmes, which generate cash collateral for reinvestment, and which reflect the desire of asset managers to maximise potential return (**Exhibit 38**).

Whatever the drivers of increased demand, however, it is clear that total balances have increased significantly and that they are predominantly held in new non-bank forms – corporates being major investors in money market

¹⁴ Zoltan Pozsar: “*Institutional Cash Pools and the Triffin Dilemma of the US Banking System*”, IMF Working Paper, August 2011

funds, and institutional investors holding short term cash equivalent claims via repo or other secured lending contracts, rather than in bank deposit money. Large institutional holders of liquid assets cannot gain security through deposit insurance, which only covers a trivial proportion of their holdings – so instead they seek to make liquid assets ‘risk free’ by taking security against assets, protected by over collateralisation, mark-to-market accounting, and variation margin.

To Pozsar therefore the story of securitisation reflected demand as well as supply factors: it was not just that banks chose to develop an “originate-and-distribute” model of credit extension in order to reduce capital requirements: but that money market funds, repo and other secured lending contracts developed as means to meet an increasing demand for new forms of safe liquid asset, new variants of ‘private money’.

Myopic risk assessment and the delusion of low risk investments

The demand side drivers of shadow banking thus included a demand for liquid assets. But also more generally a demand for instruments which were apparently low risk, but which delivered a yield uplift over conventional risk free instruments such as US T bonds. This search for yield uplift became particularly intense in an era of historically low risk free interest rates (**Exhibit 39**) which made investors particularly susceptible to the promise that the securitisation device of tranching had created low risk AAA securities out of underlying risky loans.

This susceptibility was further enhanced moreover by a tendency for assessments of credit risk and appropriate credit pricing to become self-referential. In a system where traded credit securities and credit derivatives played a more important role, the CDS spread was believed to provide important information about credit worthiness. This philosophy of market reference pricing was indeed explicitly endorsed by the IMF in its April 2006 Global Financial Stability Review, which noted with approval that (**Exhibit 40**)

“credit derivatives enhance the transparency of the market’s collective view of credit risks... [and thus]... provide valuable information about broad credit conditions and increasingly set the marginal of price of credit”.

But such a development is only beneficial if a transparent market in credit pricing leads to foresightful reflection of credit risk. In fact, CDS spreads for banks provided no useful pre-crisis warning of the impending disaster, signalling instead that the banking system had never been lower risk than in early 2007 (**Exhibit 41**). As Gennaioli, Shleifer and Vishny have argued, this reflects the inherent tendency of investors in credit securities to suffer from ‘local thinking’, myopically ignoring during the good times the downside tail of the distribution of possible returns on apparently low risk debt instruments, and then at the first sign of trouble bringing the downside risks into their consciousness, provoking self reinforcing procyclical reactions.¹⁵

Myopia may be inherent to the dynamics of a market based credit system, reinforcing still further the potential for instability created by unregulated maturity transformation, multi-step complexity, and from the combination of secured funding and mark-to-market accounting.

Financial systems which perform credit intermediation and maturity transformation – whether within banks or via shadow banks and market based credit contracts – are thus capable of generating a set of claims whose combination of apparent risk, return and liquidity is in aggregate unsustainable, and indeed impossible. In the real economy of non-financial borrowers - corporates, households, and governments - there are real risks to debt servicing capacity, risks which are themselves increased if more credit is extended. The financial system can use the techniques of pooling, tranching and maturity transformation, to produce different combinations of risk return

¹⁵ Nicola Gennaioli, Andrei Shleifer and Robert Vishny, “*Neglected Risks, Financial Innovation and Financial Fragility*”, September 2010.

and liquidity, which appeal to different investor/depositor bases, but it cannot make these risks go away. But the system can for a period of time appear to promise combinations of lower risk, higher return and greater liquidity that cannot objectively in the long term be sustained. Banks can do this: and banking systems are therefore only made stable by some combination of regulation, central bank liquidity insurance and deposit insurance. And multiple step shadow banking systems can do this too, and did so on a massive scale before the crisis.

The crisis resulted in a dramatic realisation that the claims were collectively unsustainable. Apparently liquid claims became illiquid: apparently low risk claims became high risk and fell in value; and the system's ability to generate new claims which met investors' expectations declined. And part of the policy response to the crisis – an involuntary response required to avoid disaster – has been a large scale socialisation of the credit intermediation and maturity transformation function.

- The US mortgage market becoming even more dominated by the state guaranteed GSEs.
- New credit flow to three European sovereigns – Greece, Portugal and Ireland – now provided by public institutions not by the market.
- And central bank balance sheets increasing in size to absorb both maturity transformation and credit risks which the private banking and shadow banking systems can no longer support on the same scale as before.

Faced with a diminished private capacity to create apparently low risk and liquid instruments indeed, some academics have suggested that the policy response needs to include the deliberate public creation of truly safe liquid assets – for instance via the issuance of short term Treasury Bills, obviating the need to create safe liquid assets out of potentially procyclical secured

financing instruments. Zoltan Pozsar has for instance suggested that “*one way to manage the size of the shadow banking system is by adopting the supply management of treasury bills as a macro prudential tool*”.¹⁶

But even if deliberate creation of more truly safe instruments proves part of the solution, the more general conclusion must surely be that we need to design a system which faces end investors with reality, and does not allow the development of a set of claims whose apparent combination of risk, return and liquidity is in aggregate unsustainable. Ensuring such a system requires an integrated approach to banking and shadow banking regulatory reform.

4. Addressing risks: the reform agenda

The Financial Stability Board is on the hook to deliver to the G20 leaders by the end of this year proposals on shadow banking system reform. To develop these proposals, we have put in place five workstreams which address different elements of policy workstreams. But before describing those workstreams it is useful to consider three overarching questions which should inform specific policy design (**Exhibit 42**).

- How much non-bank credit intermediation do we want: was securitisation and shadow banking a good thing which we need to revive?
- How far can we concentrate simply on ensuring that the banking system is protected from shadow banking infection, versus reforming the shadow banking system itself?

¹⁶ Zoltan Pozsar (August 2011). See also Arvind Krishnamurthy and Annette Vissing-Jorgensen, “*The Demand for Treasury Debt*”, NBER Working Paper Series, Working Paper 12881, January 2007.

- And what should we do about the procyclicality risks created by secured finance, within bank balance sheets as well as outside them?

How much non-bank credit intermediation?

First then, do we want securitisation and shadow banking to come back. We often seem schizophrenic. In the Financial Stability Board we have several times debated the challenge of ‘restarting securitisation’; and I noticed in the recent Economist Magazine feature on ‘Financial Innovation’, the following quote from a ‘senior American regulator’ “*Securitisation is a good thing. If everything was on banks’ balance sheets there wouldn’t be enough credit*”. And certainly before the crisis, securitisation facilitated credit extension, particularly in the US, and thereby gave a short term boost to economic growth. But much of that credit turned out to be of poor quality, contributing to unsustainable asset price and construction booms in residential and commercial real estate. And as Gennaioli, Shleifer and Vishny argue, many credit securities issued, and thus the underlying credit extended, “*owed their very existence to neglected risk*”. At the very core of poor credit extension in the US indeed, was the process, as Pozsar and et al put it, by which “*Shadow banking provided sources of inexpensive funding for credit by converting opaque, risky, long term assets into money-like and seemingly riskless short term liabilities*”.

That suggests that securitisation might be a good thing, but not in its pre-crisis shadow banking form.

- That it would be desirable if we saw the further development of the credit intermediation channel which connects non-leveraged long term investors to long term borrowers – a channel which includes for instance, the direct purchase of corporate bonds by insurance companies or pension funds and which could include purchases of tranching and pooled securitisations.

- But that it is inherently risky if these channels involve leverage and maturity transformation unconstrained by the prudential arrangements which apply to banks.
- And that it is therefore unlikely that securitised credit will return on a safe basis to its pre-crisis volumes, given that we know that a large proportion of it existed only because of leverage, maturity transformation, and neglected risks.

Separate or regulate?

The second question, is should we just put a cordon sanitaire around traditional banking, or do we need also to regulate shadow banking itself? We certainly need to look very carefully at the links between banks and shadow banking institutions or markets. In the pre-crisis system, banks provided explicit or implicit liquidity insurance to off balance sheet SIVs and sponsored conduits. In future we need to ensure that any such contingent liquidity commitments are fully allowed for in our liquidity regulation. And in the pre-crisis system, banks themselves traded securitised credit with woefully inadequate trading book capital support: the reforms of Basel 2.5, which impose credit related capital requirements for securitisation exposures – are designed to address that deficiency. And the regulatory separation of investment banking from classic commercial banking activity – whether via the Volcker Rule in the US or the Independent Commission on Banking proposals in the UK – will in different ways reduce the vulnerability of bank balance sheets to developments in traded credit markets.

But while these measures are all desirable, we should be wary of considering them sufficient. A shadow banking system could develop which would fully replicate banking system leverage and maturity transformation even if not supported by and linked to banks themselves: and if it did that it could generate a credit and asset price boom and bust cycle, harmful to both the macro economy and to the resilience of the banking system.

Managing the procyclicality of secured finance?

Third and finally, how to think about the secured finance arrangements which have developed over the last 30 years to be such a significant feature within our credit intermediation system, within bank balance sheets as much as in the shadow banking system. Repo liabilities account for about 10-15% of the balance sheets of major trading banks such as Barclays or JP Morgan, and longer term secured finance has grown as a proportion of total bank liabilities: in addition many banks, particularly in the eurozone, are at present heavily dependent on secured funding provided by the central bank. This increased reliance on secured funding sources is partly a response to market perceptions that unsecured debt has become riskier, perceptions which can become self-reinforcing, since the greater the proportion of the balance sheet encumbered by secured claims, the riskier the relative position of the unsecured debt holder. Once a significant proportion of fund providers seek security through collateralisation, the free market equilibrium may be that almost all fund providers (apart from insured depositors) will seek that protection.

But with collateralisation tends to come continuous mark-to-market revaluation and the calling of variation margin, and as Adrian and Shin have argued *“In a financial system in which balance sheets are continually marked-to-market, asset price changes appear immediately as changes in net worth, eliciting response from financial intermediaries who adjust the size of their balance sheets... mark-to-market leverage is strongly procyclical”*.

The greater role of secured financing on bank balance sheets has thus probably made the banking system more procyclical. The implication for regulators is that in a world where we are unlikely to reverse this development of secured finance, we need to lean against its effects in at least three ways.

- First by requiring more equity in the banking system – more ability to absorb the procyclical impact of asset value fluctuations.

- Second by regulating the amount of bail-inable unsecured term debt which a bank has to hold – limiting therefore the extent to which secured finance can encumber the balance sheet.
- And third, ideally, by seeking directly to constrain the procyclicality of secured financing markets such as repo; introducing capital requirements at contract level – minimum initial margins or haircuts – to dampen the procyclicality of haircut or margin adjustment.

The regulatory reform programme

The specific design of a regulatory reform programme should reflect these answers to the three overarching questions. Some of the specific measures required have already been introduced as part of the Basel 2.5 and Basel III reforms of banking regulation – higher trading book capital requirements, higher capital and liquidity standards overall. Some appropriate separation of market based activity and bank balance sheet activity will also be achieved by either Volcker or Vickers style reform. The FSB's five workstreams will identify whether further policy measures more specifically focussed on shadow banking itself are required in addition (**Exhibit 43**).

- The first is focussed on all the links which can exist between banks and shadow banks, and on getting right the rules which apply to consolidation for capital purposes and to the capital required to support loans or contingent loans from banks to non-bank financial entities.
- The second is focussed on money market funds specifically, since these can create money equivalent assets held by corporates, households or institutions, but outside the regulatory constraints we normally apply to private money creation. The working hypothesis of this workstream is that if a money market fund promises to its investors a constant net asset value, then it smells

like a bank and quacks like a bank, and ought to be subject to bank-like liquidity and capital constraints.

- The third is looking at the left-hand side of the system shown on Exhibit 4, the extension of credit to the real economy in securitised form, and seeks to ensure that we have adequately addressed the principal/agent and incentive problems inherent in the originate and distribute model – enforcing enough skin-in-the-game (and on a common enough basis across the world) to ensure that there are incentives for good credit underwriting.
- The fourth workstream is looking at other shadow banking entities apart from money market funds. It will seek to identify where leverage and maturity transformation could enter a non-bank credit intermediation system, and will propose appropriate constraints if required.
- The fifth is focussed not on specific institutions, but on the complex web (**Exhibit 44**) of secured financing markets – repo, prime brokerage finance, securities lending and cash collateral reinvestment - which interconnects commercial banks, broker dealers, asset managers, money market funds and hedge funds. This workstream will consider in particular whether, in order to offset the procyclicality inherent in these markets, we ideally should regulate haircut or margin practices and whether we have operationally effective mechanisms to do so.

These five workstreams together will enable us to define the programmes of reform which, along with other relevant policy changes already in hand, will address the instability created by the pre-crisis shadow banking system. It is essential that we maintain momentum and if necessary pursue radical reforms. Not least because 10 years before the 2008 crisis we had a wake up call but failed to respond adequately. Several of the system features which led to the

2007-08 crisis can be discerned in the story of LTCM's rapid rise and subsequent collapse. Some of them indeed were identified in insightful papers which reflected on those events shortly afterwards. Thus, for instance, a 2001 CGFS paper on "Collateral in wholesale financial markets" noted the danger that a more collateralised system could be one in which secured funding stresses would affect market liquidity (as per Brunnermeier and Pedersen's hypothesis) and in which therefore there was an increased danger of *"the emergence of vicious circles in which falling asset prices generate liquidity pressures and defaults, in turn generating asset sales and new price declines"*.¹⁷ It considered a range of possible policy responses, including some of those now again being considered; but it was not followed up by policy action as the apparent threat to financial stability declined over the subsequent years.

This time we need to ensure that we are sufficiently radical. But also not fool ourselves that any set of reforms we can now design will be sufficient to make the system permanently safe, nor that we can intervene so precisely as to preserve those aspects of non-bank credit intermediation which might be valuable while excising only the harmful elements. For it is the nature of modern global finance, that it continually mutates to create new risks and new interconnections. At an IMF conference last March, the economist Paul Romer suggested that *"Every decade or so, any finite system of financial regulation will lead to systemic financial crisis, we need therefore to continually adjust our regulatory response to changing circumstances"*. To inform that response we need to keep the system under permanent surveillance. If we do it well that surveillance will enable us to spot important trends and emerging risks, but it will never provide us with a precise map of all the ways in which the system is interconnected and through which risks are transmitted.

¹⁷ Committee on the Global Finance System (CGFS), *"Collateral in Wholesale Financial Markets: Recent Trends, Risk Management and Market Dynamics"*, March 2001.

One of the odder sounding recommendations to appear recently in an official report on shadow banking, is that made in the July 2010 report from the Federal Reserve Bank of New York, where the authors state clearly “*We recommend putting the accompanying map of the shadow banking system on a 36 inch by 48 inch poster*”. But it’s a necessary recommendation given the sheer complexity of the system they have mapped – see Exhibit 5. Any system this complex will defy complete understanding: and any belief that we can precisely calibrate our response to it will therefore be a delusion. Given the enormous cost which instability can produce, and given the uncertain benefits which this complexity has delivered, our regulatory response should therefore entail a bias to prudence – a bias against complex interconnectivity, against procyclical market contracts, and against allowing maturity transformation or high leverage to develop in unregulated institutions or markets.