

PERSPECTIVES

**CRUNCHED:
LESSONS FROM THE 2007 TLA CRISIS**

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Welcome to the TLA crisis

Difficulties in the US subprime market and the subsequent fallout across financial markets more generally, culminating in a limited credit crunch in August and September, have cast a pall over what had otherwise been another good year for the global economy. Indeed, at the time of writing, the final consequences for the real economy remained unclear.

While the recent turmoil has often been named after the subprime sector in which it originated, it could equally well be described as the TLA crisis, given the way in which analyses of events have been liberally scattered with multiple references to a host of Three Letter Acronyms, or TLAs, including MBSs (Mortgage Backed Securities), ABSs (Asset Backed Securities), CDOs (Collateralised Debt Obligations), CLOs (Collateralised Loan Obligations) as well as SIVs (Structured Investment Vehicles) and SPVs (Special Purpose Vehicles).

This *Perspectives* is split into three parts. Part one comprises an overview of developments to date. Part two highlights one overarching lesson about the ubiquity of financial crises and Part three discusses three sets of lessons: lessons about structured finance; about regulation and supervision, and about central bank policy. A brief conclusion follows.

Part 1. Anatomy of a credit crunch

What got markets and policymakers particularly exercised about the TLA crisis – besides a belated recognition that ‘risk was back’ and of course the sobering prospect for many market participants of foregone profits and bonuses – was the danger of a severe credit crunch that

¹ This Lowy Institute *Perspectives* draws on presentations given by the author at two ABN-AMRO Non-Executive Directors forums on *Credit Crunch – Lessons in repricing risk and liquidity*, held on 9 October 2007 in Sydney and 11 October 2007 in Melbourne.

would undermine activity in the real economy. What is a credit crunch? There is no single, strict definition, but the basic idea is fairly straightforward: a credit crunch involves a sharp contraction in the *supply* of credit that is available at a given interest rate.² In the case of the world's latest financial upset, the evaporation of credit has occurred in the commercial paper and interbank markets, but has not (yet?) spread to the overall economy, and the world's central banks, led by the US Federal Reserve (the Fed) and the European Central Bank (ECB), have been doing their best to make sure that doesn't happen.

While it would be quite untrue to say that the current problems came out of the blue (central banks and regulators had been warning of a mis-pricing of risk for some time), nevertheless, the severity of the unwinding events has still proved to be a nasty surprise for a world economy that had been doing rather well. So what went wrong? Basically, the TLA crisis has been the product of a combination of factors, including a US housing price bubble and financial innovation.

Blowing up US house prices

The origins of the TLA crisis are to be found in the US housing market.³ Low interest rates, particularly in 2002 and 2003, had made housing look like an increasingly attractive asset (not just in the United States – this was an *international* phenomenon), and as demand responded this fed through into higher prices which, as is the way of booms, then appeared to validate the attractiveness of the investment decision. What started off as a series of regional house price booms morphed over time into a national boom, and as the magnitude of price rises became ever harder to explain in terms of economic fundamentals, that boom increasingly took on the nature of a speculative bubble.⁴ As the boom continued, and the bubble inflated, lending standards began to slide and the quality of new housing loans declined in parallel, particularly in the case of loans made to borrowers with poor credit, so-called subprime loans.⁵

² Bernanke and Lown define a credit crunch as a reduction in the supply of credit that is abnormally large for a given stage of the business cycle. Ben S. Bernanke and Cara S. Lown, *The credit crunch. Brookings Papers on Economic Activity* (2) 1991.

³ For a good analytical overview of events see Ben S. Bernanke. *The recent financial turmoil and its economic and policy consequences*. Speech by Chairman Ben S Bernanke at the Economic Club of New York. New York, 15 October 2007. This survey draws on Bernanke's narrative. See also Nick Timros, Behind the US mortgage mess. *The Wall Street Journal*, 11 August 2007. And Alan S. Blinder, Six fingers of blame in the mortgage mess. *The New York Times*, 30 September 2007.

⁴ See Robert J Shiller, *Understanding recent trends in house prices and home ownership* (paper presented at the Housing, housing finance and monetary policy, Jackson Hole, Wyoming, 31 August - 1 September 2007).

⁵ More formally, subprime loans are typically made to borrowers with one or more of the following characteristics: weak credit histories that include delinquencies and bankruptcies; low payment

Financial innovation at work

This housing boom took place against the backdrop of, and was fuelled by, a mortgage market that had been transformed by financial innovation.⁶ Under the old – *originate-and-hold* – system, lenders, usually banks, would typically keep their mortgage loans on their balance sheets until the loan was repaid. Under the new system – *originate-and-distribute* – the originator of the mortgages does not hold them on its books, but instead sells the loans on to another party, often via a series of middlemen. To make them attractive to investors, the loans are bundled together into bonds whose payments are based on the servicing of the underlying mortgages. The process is known as securitisation, and the bonds that it creates as Mortgage Backed Securities (MBSs). An MBS is an example of an Asset Backed Security (ABS), whereby bonds or notes are based on pools of assets (mortgages, credit card receivables), or the cash flows derived from them.⁷

The innovation process does not stop here, however, since pools of ABSs can themselves be securitised. The resultant instruments are known as Collateralised Debt Obligations (CDOs), an example of structured (credit) products. CDOs purchase a portfolio of assets and then sell the payments from the underlying asset collateral pool (principal and interest payments in the case of mortgages, but other possibilities would be loan or bond payments) to investors. These sales are structured into tranches which are characterised by different risk and return profiles. So, for example, a standard structure would see payments split between senior, mezzanine and equity tranches, such that the senior tranches receive their payments first, followed by the mezzanine tranche, and with the equity tranche entitled to whatever is left. In the event of losses hitting the underlying portfolio (triggered say by mortgage defaults), the equity tranche absorbs any losses first, followed by the mezzanine tranche. Only if losses exceed the value of both tranches does the senior tranche start to take losses. The lower tranches therefore bear more risk, with the risk profile of the equity tranche in particular seeing it described as the equivalent of ‘toxic waste’.⁸ More complex versions of these CDOs (such as synthetic CDOS, CDOs of CDOs or CDO² and so forth) have also proliferated.

capacity; and incomplete credit histories. International Monetary Fund (IMF), *Global Financial Stability Report. Financial Market Turbulence: Causes, Consequences, and Policies*. World Economic and Financial Surveys. Washington DC, September 2007.

⁶ For a discussion of these issues, see Richard J Rosen, The role of securitization in mortgage lending. *Chicago Fed Letter* (244) 2007. On the institutional changes in the US mortgage market, see Ben S. Bernanke, *Housing, housing finance and monetary policy* (paper presented at the Symposium sponsored by the Federal Reserve Bank of Kansas City on Housing, housing finance and monetary policy, Jackson Hole, Wyoming, 31 August - 1 September 2007).

⁷ In other words, an MBS is an ABS that is backed by mortgage loans.

⁸ See for example Darrell Duffie, *Innovations in credit risk transfer: implications for financial stability* (paper presented at the Sixth BIS Annual Conference: Financial System and Macroeconomic

Given the complexity and opacity of some of these structured credit instruments, *buyers* have tended to rely on ratings provided by the rating agencies to inform them as to the underlying risk they might be taking on. At the same time, *sellers* also sought rating agency guidance as to how to structure the various tranches in order to secure the required rating – typically investment grade (AAA to A) in the case of the senior tranches.

The bubble deflates

US house prices peaked in 2006, and then started to fall, and at this point the rate of delinquencies on the part of homeowners started to rise. Inevitably, problems were particularly apparent in the riskier subprime sector and, equally inevitably, this had knock-on effects on the various financial instruments backed by these loans. As a result, in mid-2007 the ratings agencies responded to the deterioration in subprime loans by downgrading an ‘unprecedented’ amount of ABSs collateralised by subprime mortgages. This in turn triggered downgrades to those CDOs that had used these ABSs as collateral. In some cases, the resultant downgrades involved multiple notches, with some of the victims including hitherto AAA-rated tranches.⁹ Investors were now becoming increasingly nervous about the reliability of the credit ratings of these structured products. Their loss of confidence produced a sharp fall in demand, triggering a fall in price and a drop in market liquidity (the ability to quickly and easily buy, or in this case sell, an asset without triggering a major price discontinuity).

Market fears about the true value of their investments took another big hit in late June 2007, when two hedge funds run by Bear Stearns, both of which had significant exposures to the subprime sector, ran into trouble, as an acute shortage of buyers called into question the true market value of the structured products they held.¹⁰ As well as spreading across *markets*, the problem was also spreading across *borders*: in Australia, for example, local hedge funds (Basis Capital and Absolute Capital) that had invested heavily in CDOs were also running into difficulties.

Resilience, Brunnen, Switzerland, 18-19 June 2007). Also Olivier Cousseran and Imene Rahmouni, The CDO market: functioning and implications in terms of financial stability. *Banque de France Financial Stability Review* (6) 2005. Senior and mezzanine tranches may also receive additional forms of protection or credit enhancement in order to secure the required rating.

⁹ International Monetary Fund (IMF), *Global Financial Stability Report. Financial Market Turbulence: Causes, Consequences, and Policies*.

¹⁰ Eventually, one fund was wiped out, and the other written down by 90%. Justin Lahart and Aaron Lucchetti, Wall Street fears Bear Stearns is tip of an iceberg. *The Wall Street Journal*, 25 June 2007. See also John Authers, Subprime coming home to roost? *Financial Times*, 26 July 2007.

As investors became increasingly reluctant to buy products backed by subprime mortgages, contagion effects saw this buyers' strike spread to other mortgage-related assets, and from there to markets for asset-backed commercial paper (ABCP).¹¹ The ABCP market comprises institutions which have created special purpose vehicles (SPVs) to issue commercial paper in order to fund the purchase of various assets, including structured products. As concern about the quality of the latter mounted, investors became increasingly unwilling to roll over the commercial paper, and the SPVs were forced to turn instead to backup credit lines provided by commercial banks.

Internationally, matters came to a head on 9 August, when BNP Paribas announced that it was suspending the operations of three of its own money funds because it was unable to value the ABCP they held, due in turn to the 'complete evaporation of liquidity in certain market segments of the US securitisation market.'¹² On 14 August, a few days after the BNP Paribas news, Australian mortgage lender RAMs announced that the crisis in US commercial paper markets was threatening its financial position. The day before, Northern Rock had told the UK's Financial Services Authority (FSA) that it was in difficulty, for similar reasons, kick-starting a train of events that would culminate in September 2007 with Britain's first bank run since the 1860s.

Crunched

As concerns about market liquidity and credit risk began to wash over more and more markets, the banking sector began to worry that it might find itself facing growing calls to provide financial support to the various SPVs in the commercial paper market. Together with the prospect of having to keep more assets on their balance sheets in the future (re-intermediation, to use the jargon), since demand for many ABSs had dropped so sharply, this meant banks found themselves facing the prospect of an increased call on both their cash and their balance sheets. This prompted them to start to hoard liquidity, in part by curtailing their lending to other banks. The result was significant pressure in the interbank markets and the growing prospect of a major credit crunch. The disruption of these key markets prompted intervention by the Fed and the ECB in the form of sizeable injections of liquidity.

¹¹ Commercial Paper is private short-term debt (maturities are less than nine months, and typically much shorter), traditionally issued by highly rated borrowers in order to secure their short-term financing needs. ABCP is short-term paper issued by SPVs – conduits or Special Investment Vehicles (SIVs) – that is typically used to fund the purchase of long-term, higher-yielding assets. The ABCP is 'backed' by these assets. See for example Gillian Tett, Paul J. Davies and Norma Cohen, Structured investment vehicles role in crisis. *Financial Times*, 12 August 2007.

¹² Anuj Gangahar, BNP Paribas freezes three funds. *Financial Times*, 9 August 2007.

What went wrong?

How did a problem in the US subprime sector end up creating global financial losses which ‘have far exceeded even the most pessimistic projections of credit losses on those loans’?¹³ Basically, and as the Fed’s Ben Bernanke has suggested, what seems to have happened is that the original problems with subprime loans prompted investors to become *much* more uncertain about the valuations not just of financial products linked to subprime mortgages, but also about a wider range of structured credit products. The outcome was a sharp contraction in market liquidity for a series of instruments. At the same time, events also prompted an increase in risk aversion in the financial markets, with a somewhat more general (but still not wholesale) repricing of risk.¹⁴

Part 2: The big lesson: it’s never different this time

Perhaps the most important lesson of the TLA crisis can be summed up by the proposition that *It’s never different this time*. As described above, the origins of the current problems are to be found in a good old-fashioned bubble, this time in the housing market. Repeated experience should tell us that, regardless of whether the asset in question is emerging market debt, dot.com shares, or real estate, after a prolonged run-up in prices, sooner or later normal valuations *will* reassert themselves, and asset price bubbles *will* burst.¹⁵ How do we know if it’s a bubble? There is a theoretical literature that attempts to define precisely what constitutes a bubble, but in practice bubbles are usually like an attractive person: we know one when we see one.

The basic point, then, is that financial or credit cycles are always with us. Moreover, there seems to be a clear tendency for periods of prolonged financial *stability* to be followed almost inevitably by periods of *instability*, as extended good times lead the financial sector into complacency and excessive risk-taking.

¹³ Bernanke, *Housing, housing finance and monetary policy*.

¹⁴ Bernanke. *The recent financial turmoil and its economic and policy consequences*. Speech by Chairman Ben S Bernanke at the Economic Club of New York.

¹⁵ A similar point is made in Michael Bordo, *The crisis of 2007: the same old story, only the players have changed*. (paper presented at the Federal Reserve Bank of Chicago and International Monetary Fund conference: Globalization and Systemic Risk, Chicago, Illinois, 28 September 2007).

Minsky moments, manias, panics and crashes

This last proposition is, of course, a variant on an old argument. It is one that has been advanced, for example, in the writings of Hyman Minsky, as well as in the literate historical analysis of Charles Kindleberger's *Manias, panics and crashes* (which draws on Minsky's work and extends it to an international setting).¹⁶ Indeed, Minsky's writings have enjoyed something of a revival thanks to the TLA crisis, although others might prefer to take a more 'Austrian' perspective on developments.¹⁷

Minsky's basic proposition was that over periods of prolonged prosperity, an economy will move from a set of financial relations that make for a stable system to financial relations that make for an unstable one, culminating in a 'Minsky moment'.¹⁸ We should be well aware by now that there is ample evidence for procyclicality in the financial system, with credit spreads, asset prices and various risk ratings all moving together, such that risk tends to be underestimated in booms (when risk is often rising) and overestimated in slumps (when risk has peaked).¹⁹ This tendency to generate powerful positive feedback effects does appear to make the financial system vulnerable to speculative excesses, and suggests that, at least under some circumstances, 'market discipline' is likely to be notable mainly by its absence.

Bubble trouble

While a vulnerability to financial bubbles is always with us, the more interesting question to ask is, have we become *more* vulnerable to bubble trouble than in the past?

¹⁶ For example Hyman P Minsky, *The financial instability hypothesis*. Working Paper No 74. Annandale-on-Hudson, New York, The Levy Economics Institute of Bard College, May 1992. Charles P. Kindleberger, *Manias, panics and crashes*, Fourth ed. New York, John Wiley and Sons, Inc, 2000.

¹⁷ For Minsky's relevance to the TLA crisis, see Justin Lahart, In time of tumult obscure economist gains currency. *The Wall Street Journal*, 18 August 2007. Also George Magnus, What this Minsky moment means. *Financial Times*, 22 August 2007. And Charles J Whalen, *The US Credit Crunch of 2007: A Minsky Moment*. Public Policy Brief. Annandale-on-Hudson, New York, The Levy Economics Institute of Bard College, 2007. For a more Austrian approach, see for example William R White, *Is price stability enough?* BIS Working Papers No 206. Basel, Bank for International Settlements, April 2006. Also Stefan Erik Oppers, *The Austrian theory of business cycles: old lessons for modern economic policy?* IMF Working Paper WP/02/2. Washington DC, International Monetary Fund, January 2002.

¹⁸ Minsky describes this as a transition from a system where hedge financing (in Minsky's terminology, hedge financing units are those which can fulfil all of their contractual payment obligations by cash flows) dominates to one where speculative (units that can meet interest but not principle payments out of cash flows) and Ponzi (cash flows can cover neither principal nor interest) finance dominates. Minsky, *The financial instability hypothesis*.

¹⁹ Claudio Borio, Craig Furfine and Philip Lowe, *Procyclicality of the financial system and financial stability: issues and policy options*. BIS Papers No 1. Basel, Bank for International Settlements, March 2001. Also Claudio Borio, *Monetary and prudential policies at a crossroads?* BIS Working Papers No 216. Basel, Bank for International Settlements, September 2006.

For much of the postwar period, the overriding concern for central bankers was high inflation. After the 1980s, however, inflation appears to have been substantially tamed, an achievement that, together with a parallel decline in the volatility of output, has been dubbed *The Great Moderation*. Credit for this achievement is often shared between the enhanced credibility and increased effectiveness of monetary policy (take a bow, central bankers) and the benign price effects of globalisation. At the same time, however, it has become clear that price stability alone has not been sufficient to remove the threat of financial instability. Indeed, it is possible to make the case that in the current period financial instability has succeeded inflation as the new ‘great villain’ that needs to be defeated by central bankers.²⁰

There *does* seem to be some evidence that the international incidence of financial crises has increased in the modern period, and in particular after the breakdown of the Bretton Woods system of managed exchange rates and heavily regulated national financial systems. It is possible that this increase in the incidence of crises is a side-effect of globalisation, perhaps because the increased benefits from international trade and financial integration have increased the costs of financial repression, and so encouraged a shift to greater financial liberalisation that has in turn led to greater financial vulnerability. It is even possible that low inflation might have played a contributory role by, for example, allowing central banks that are focused on standard measures of inflation to keep monetary conditions looser for longer, so providing more time for a build-up of financial imbalances.²¹

Financial innovation and incentives

If our vulnerability to financial accidents in general, and to asset bubbles in particular, has increased, then it seems likely that developments in the financial sector itself must have played a key role.

²⁰ On the Great Moderation see for example Ben S. Bernanke. *The Great Moderation*. Remarks by Governor Ben S. Bernanke at the meetings of the Eastern Economic Association. Washington DC, 20 February 2007. On the failure of price stability to deliver financial stability see White, *Is price stability enough?*, And on the new ‘great villain’ see Claudio Borio and William R White, *Whither monetary and financial stability? The implications of evolving policy regimes* (paper presented at the Symposium sponsored by the Federal Reserve Bank of Kansas City on Monetary policy and uncertainty: adapting to a changing economy, Jackson Hole, Wyoming, 28-30 August 2003).

²¹ On the frequency of crises, see Michael Bordo, Barry Eichengreen, Daniela Klingebiel and Maria Soledad Martinez-Perez, *Is the crisis problem growing more severe? Economic Policy* 32 (1) 2001. The case for a link between globalisation and crises is made in Paul Krugman, *Crises: the price of globalization?* (paper presented at the Symposium sponsored by the Federal Reserve Bank of Kansas City on Global economic integration: opportunities and challenges, Jackson Hole, Wyoming, 24-26 August 2000). The link between low inflation and crises is discussed in Borio, *Monetary and prudential policies at a crossroads?*

It is certainly the case that the last three decades have represented a period of profound change for the global financial system. The scale of deregulation, innovation, and institutional change has been dramatic. Martin Wolf describes this process as the world shifting from mid-20th century managerial capitalism to global financial capitalism.²² This transition has involved a move from a series of highly regulated and segmented domestic financial systems to a deregulated, increasingly interlinked global financial system.²³ Such a major shift has had profound consequences, and most of these consequences have been very positive indeed. But there is (of course) no such thing as a free lunch, and the very significant gains brought by the new financial environment have also come with some costs. These include an increase in complexity, which means that financial accidents and their consequences may become more unpredictable, and an increase in interconnectedness, with the implication that financial accidents are now more likely to spread across markets *and* borders.²⁴

There also appears to have been a further, problematic result. That is, the new financial system may have changed the incentives of participants in a way that makes it riskier than before. This is an argument that has been laid out rather nicely by former IMF chief economist Raghuram Rajan.²⁵ His thesis is that in today's deregulated, competitive financial markets, the compensation for those who are managing investors' money is now closely tied to the returns that they can generate relative to their peers. This has had two unfortunate consequences. First, there is an incentive for these managers to take on extra, non-transparent risk in a way that makes them look like they are outperforming their competitors. The easiest way for them to do this is to take on 'tail risks' – that is, take risks that pay out generously most of the time but have a small probability of a *very* big loss. Second, there's an incentive to 'herd' with other investment managers, since if everyone makes similar investment decisions, there's less risk of underperforming one's peers. Rajan points out that these two sets of behaviours can become mutually reinforcing during an asset price bubble, when managers are willing to take on the tail risk that prices might suddenly revert to fundamentals while knowing that herding means that they won't under-perform their competitors if that risk should eventuate. On the other hand, if they stay out of the market, their observed *relative* performance is going to suffer during the period of bubble expansion.

²² Martin Wolf, Unfettered finance is fast reshaping the global economy. *Financial Times*, 18 June 2007.

²³ Claudio Borio, *Change and constancy in the financial system: implications for financial distress and policy*. BIS Working Papers No 237. Basel, Bank for International Settlements, October 2007.

²⁴ Borio, *Monetary and prudential policies at a crossroads?*

²⁵ Raghuram G Rajan, *Has financial development made the world riskier?* (paper presented at the Symposium sponsored by the Federal Reserve Bank of Kansas City on The Greenspan Era: lessons for the future, Jackson Hole, Wyoming, 25-27 August 2005).

Rajan's analysis provides one explanation of the procyclicality for financial markets described above, as well as a story about why this might have increased. It is also possible that this procyclicality can be reinforced by a period of low interest rates. In such an environment investors with long-term fixed interest rate liabilities (such as insurance companies) will tend to seek yield by taking on more risk. At the same time, institutions whose managers are compensated on the basis of nominal returns (such as hedge funds) will similarly face an incentive to enhance return via greater exposure to risk.²⁶

Savings gluts, investment shortages and the search for yield

How does the previous analysis apply to the TLA crisis? It seems clear that one important driver of recent developments has been a prolonged period of low nominal and real interest rates. Part of this low interest rate environment reflects the transition from *The Great Inflation* of the 1970s to *The Great Moderation* of the current period. At the near end of the yield curve, it also reflects the sustained period of easy money that has been delivered by the world's major central banks since early in the current millennium, in particular by the US Fed and the Bank of Japan.

At the longer end of the yield curve, the decline in rates reflects the evolution of global savings and investment trends. Ben Bernanke, for example, has argued that low interest rates are a product of the emergence of a global savings glut due to a combination of demographic change (ageing populations in the developed world seeking to make provision for retirement) and a series of painful financial crises in emerging markets that persuaded them to switch from being international borrowers to international lenders.²⁷ Others have focused on the investment side of the story, suggesting a worldwide shortage of fixed assets (due to relatively low global nominal investment in physical assets) or of financial assets (due to the destruction wrought by earlier financial meltdowns).²⁸

This sustained period of low interest rates triggered a search for yield, much as described above, which in turn involved investors taking on a progressively greater combination of risk

²⁶ Ibid.

²⁷ Ben S. Bernanke. *The global saving glut and the US current account deficit*. Remarks by Governor Ben S Bernanke at the Sandridge Lecture, Virginia Association of Economics. Richmond, Virginia, 10 March 2005.

²⁸ Raghuram G Rajan. *Is there a global shortage of fixed assets?* Remarks by Raghuram G Rajan, Economic Counselor and Director of Research, IMF, at the G-30 meetings. New York, 1 December 2006. Ricardo J Caballero, *On the macroeconomics of asset shortages* (paper presented at the Fourth ECB Central Banking Conference on The role of money: money and monetary policy in the Twenty-first Century, Frankfurt, November 2006).

and leverage. The demand for yield also encouraged the financial sector to create new and more complex financial products aimed at offering higher returns. In his entertainingly cynical review of the derivatives business, Satyajit Das argues that the real reason investing in structured credit products took off in the current decade was precisely because of the low returns on offer from traditional equity and bond markets, so what could be packaged as effectively a new asset class was attractive to investors in search of yield.²⁹

Part 3: Three sets of Lessons

As well as one big lesson about the ubiquity of asset bubbles and financial accidents, the TLA crisis has also delivered some useful lessons about structured finance, regulation and supervision, and central bank policy.

(i) Lessons about structured finance

There is no doubt that structured finance or securitisation – in the sense of the pooling and repackaging of financial assets – has been an extremely powerful tool for the financial sector, and one that has delivered substantial economic gains, including lower borrowing costs and greater access to finance. But the TLA crisis has served as a reminder that the new model also has some important risks and drawbacks.³⁰

- Principals, agents and incentive problems

One important issue is that the new originate-and-distribute model has done a much worse job of dealing with the so-called principal-agent (P-A) problem than the old originate-and-hold model. The P-A problem is a very familiar one in economics and arises when a principal (say an investor) hires an agent (manager) to act on his behalf under conditions where the principal has less than perfect information about the actions of the agent. The principal's problem is to try and structure incentives to get the agent to act in ways that maximise the benefit for the principal, rather than for the agent.

²⁹ Satyajit Das, *Traders, guns & money: knowns and unknowns in the dazzling world of derivatives*. Harlow, Prentice Hall Financial Times, 2006. p. 282. The importance of the search for yield is emphasised in Mervyn King. Speech by Mervyn King, Governor of the Bank of England, at the Northern Ireland Chamber of Commerce and Industry. Belfast, 9 October 2007.

³⁰ For more detail on securitization and the mortgage market, see Rosen, The role of securitization in mortgage lending. For a general discussion on the use of credit derivatives, see The Economist, At the risky end of finance. *The Economist*, 19 April 2007.

Take the case of mortgages. The investor wants to be sure that the originator of the mortgages is doing the appropriate due diligence to make sure that the lenders will be able to meet their repayments. Under the old originate-and-hold model, the P-A problem is solved by having banks hold the loans they make on their books, giving them a strong incentive to monitor their quality. In effect, the banks are both principal and agent. But under an originate-and distribute model, the loan originators sell on the mortgages, which effectively changes their role to that of agent, acting on behalf of the investors who buy the repackaged securities.³¹ Hence they have a lower incentive to monitor loan quality, but retain a strong incentive to generate as many loans as possible (because this is how they earn their income).

Put these skewed incentives on the part of the originators together with the speculative mania created by the US housing boom, and the result is products such as ‘teaser loans’ (where borrowers get a loan on a low interest rate which is then jacked up after two years), ‘stretch loans’ (in which the borrower commits more than 50% of gross income to make monthly payments) and even ‘liar loans’ (where the borrower only has to state an annual income, with no supporting documentation). This army of somewhat dubious products arguably culminates with ‘NINJA loans’ (for the borrower with no income, no job and no assets).³²

The process also became extremely vulnerable to widespread fraud, reportedly along the whole length of the finance chain: some borrowers were lying to lenders in order to get better rates and larger loans, some originators were lying to borrowers about the terms of their loans, and some originators were lying to banks about the qualifications of the borrowers.³³ Again, this is nothing new. As Kindleberger puts it, “[t]he propensities to swindle and be swindled run parallel to the propensity to speculate during a boom.”³⁴

Finally, the P-A problem also seems to have come into play once the underlying asset was in trouble. Another unfortunate side-effect of the bundling process appears to have been removing the incentive for the originator to manage the loan once it ran into trouble, in order to maintain the value of the asset. This is bad news both for the borrower, and for the investor who might find that the asset value will decline more than it need have done.

³¹ In the case of the US subprime market, roughly half of the loan originators were banks, and half were independent (and largely unregulated) agents and brokers.

³² Steven Pearlstein, 'No money down' falls flat. *Washington Post*, 14 March 2007.

³³ Brooke Masters and Saskia Scholtes, Payback time. *Financial Times*, 9 August 2007.

³⁴ Kindleberger, *Manias, panics and crashes*. p. 73.

- Complexity, opacity and model risk

Under the originate-and-distribute model, the new principals – the investors who had bought the repackaged mortgages and other structured credit products – clearly do have a strong incentive to monitor the risk and return profile of their investments. But they are faced with two problems. The first is that they are often a long way down the financial market chain from the mortgage originators, making monitoring difficult. The second is that many of the financial instruments they had invested in turned out to be tough to value accurately given their complexity and opacity. This was particularly the case for some of the variant CDOs.

This second problem was highlighted by the buyers' strikes described above, which signalled a truly fundamental market breakdown. Markets are all about putting together buyers and sellers to create a price, yet at times during the TLA crisis, they were apparently unable to value some of the assets in question.

In fact, even in normal times, estimating a value for some of these instruments was a difficult task. Since there is a very shallow secondary market for many of these products, mark-to-market valuation has to be replaced by 'mark-to-model' valuation, with investors calculating theoretical prices for the CDOs they held. This left them heavily exposed to model risk. In the case of the two Bear Stearns funds blown up by the crisis, for example, auditors had estimated that more than 60% of their net worth was tied up in structured products whose reported value had to be estimated by the management of the funds, due to 'the absence of readily ascertainable market values'.³⁵

One particular challenge in valuing CDOs relates to the need to estimate correlations between the various assets that are held in the underlying portfolio. The exact degree of correlation makes a huge difference to the potential loss distribution of that portfolio, since as correlations increase, so does the likelihood of an extreme (tail) event.³⁶ To take the polar example, if the defaults are all perfectly correlated, then either *all* of the underlying assets will default, or none of them will. Modelling default correlations is difficult, and is widely seen as being the weakest link in the pricing of CDOs.³⁷

³⁵ Matthew Goldstein and David Henry, Bear bets wrong. *BusinessWeek*, 22 October 2007. The same securities accounted for about 10% of *total* assets of the combined funds.

³⁶ Cousseran and Rahmouni, The CDO market: functioning and implications in terms of financial stability.

³⁷ Duffie, *Innovations in credit risk transfer: implications for financial stability*.

Arguably, an even *more* fundamental problem was that at least some of the valuation models used seem to have embodied the assumption that the instruments in question could be readily sold on a secondary market – despite the fact that one reason the model was required in the first place was that this was clearly not possible.

- Downgrading the ratings agencies

Given the difficulties created by P-A problems, and by the complexity and opacity of the instruments themselves, investors looked to the ratings agencies for a guide as to the risk and value of their investments. Unfortunately, there were two problems with relying on their judgements.

First, the agencies themselves had to grapple with the same valuation problems described above. According to one assessment, methodologies for rating CDOs are still at a ‘relatively crude stage of development’ with, for example, ‘rudimentary assumptions’ made about the correlation parameters used in the ratings models.³⁸ Experience also shows that CDO ratings tend to be volatile, and are more likely to be downgraded more frequently and more severely than either traditional securitisation products or corporate bonds.³⁹ Hence, as happened in the crisis, investors could confront a situation where their AAA risk was suddenly transformed into CCC risk.⁴⁰

Second, there were important incentive issues in play. As mentioned above, as well as their ratings business, the agencies were also running an advisory business geared to helping the issuers of CDOs achieve their desired ratings. In many ways, this makes a lot of sense: after all, who else would be better placed to give such advice? But it did create a question over who was the priority customer for the agencies – the investor who relied on the ratings, or the issuer who paid for them?

- Some unpleasant side-effects

Finally, there turned out to be a couple of unpleasant side-effects associated with securitisation and CDOs.

³⁸ Ibid.

³⁹ See Box 5 in Cousseran and Rahmouni, *The CDO market: functioning and implications in terms of financial stability*.

⁴⁰ The ratings agencies have also pointed out that they were only rating credit (default) risk of the instruments in question, and not market/liquidity risk.

First, while the dispersal of risk involved in packaging up mortgages or other underlying assets and selling them off to investors was generally viewed as a good thing (by reducing concentration risk), it also turned out to mean that more players were affected when things went wrong. It also created a fair degree of uncertainty amongst market players as to just which institutions were going to be hit by the TLA crisis, adding to the general level of risk aversion.

Second, the pooling of diverse instruments into some CDOs led to the creation of unexpected correlations between instruments and markets that would normally not be expected to move together. For example, including subprime MBSs in CDOs alongside other mortgages and corporate bonds, meant that if an investor in the CDO wanted to reduce his or her exposure, or hedge it by taking a position in the underlying assets, then the various subcomponents would tend to move together, creating contagion across markets. Once again, this is not a particularly new lesson, but rather a variant on a lesson that should have been learnt during the LTCM crisis, when hedge funds discovered that their need to sell liquid assets to meet margin calls on illiquid positions similarly created unforeseen contagion effects.

(ii) Lessons about regulation and supervision

The second set of lessons from the TLA crisis applies to regulation and supervision. Clearly some of these are very specific to the current crisis, such as the need to get incentives right for mortgage originators in the US market, for example, and to provide sufficient regulation to discourage the most egregiously fraudulent behaviour. Regulators are also likely to focus on transparency (and perhaps the need for standardisation) in the structured credit markets at the heart of the TLA crisis.⁴¹ For example, one proposal has been that regulators should seek to push as many financial securities as possible on to clearing house-based exchanges, on the grounds that the standardisation involved would create transparency (and hence enhance market liquidity).⁴² There are also some general lessons.

- Losing the arms race

Perhaps the most obvious point to be made here is another old lesson: regulators are locked into a perpetually losing arms race with financial markets. So long as we operate a liberal financial system, then regulators will always be struggling to keep up with the rapid pace of

⁴¹ Paul J. Davies, Saskia Scholtes and Gillian Tett, Watchdogs look for more transparency on securitisations. *Financial Times*, 10 October 2007.

⁴² Stephen Cecchetti, A better way to organise securities markets. *Financial Times*, 5 October 2007.

market innovation, and financial accidents will be an unavoidable corollary of this situation. Or, to borrow from my colleague Stephen Grenville, another way to look at this is that in a race between regulatory bloodhounds and market greyhounds, there is only ever going to be one winner. Only by sacrificing the major gains delivered by liberalised financial systems and returning to a system of financial repression is this likely to change, and unless crises get a lot worse and/or a lot more frequent, there is – rightly - not going to be any appetite for such a move.

- **Best practice no more?**

Still, that doesn't mean that there is nothing that regulators can do. They can try to make sure that they have the right regulatory framework in place, for example. Before the TLA crisis, the UK tripartite system (whereby the Bank of England acted as the lender of last resort, the FSA as supervisor and regulator, and the Treasury as the provider of deposit insurance) had been touted as global best practice. But the credibility of this framework has now been called into question by the UK's first bank run since the nineteenth century. The difficulties created by coordination problems between the three institutions prompted one commentator to deride the tripartite arrangement as the 'Bermuda Triangle' of the British financial system.⁴³

- **Banking on bailouts**

The Northern Rock debacle also revealed problems with the UK's limited deposit insurance protection (which insured 100% of just the first £2,000 on deposit and then 90% of the next £33,000, and which had no guarantee of a quick payout). It turns out that such limited protection is next to useless when it comes to preventing a bank run. Either a full guarantee is needed, or there is little point in providing protection.

Deposit insurance, together with the Central Bank's role as lender of last resort (of which more in the next section) is intended to help mitigate the risk of a bank run. Because banks are vulnerable to runs given the well-known maturity mismatch between their liabilities (deposits which can be withdrawn at short notice) and assets (typically loans with longer maturities), and because bank failures can be so costly for the economy overall, the authorities provide deposit insurance to try and reduce the likelihood of depositors feeling the need to pull out their money and trigger a run on the bank.

⁴³ John Plender, Remember liquidity at Basel. *Financial Times*, 9 October 2007.

However, the knowledge that if things go pear-shaped the authorities will step in and effectively nationalise the troubled institution's liabilities (while leaving the assets in private hands) creates a major moral hazard problem, since bankers will know that when they make risky bets, if things go well the profits will accrue to their shareholders, while any losses will be borne by the taxpayer. The usual mechanisms to mitigate this problem include providing only limited deposit insurance (so there is no full guarantee) and imposing supervisory and regulatory constraints on the banks to monitor and modify their behaviour. The Northern Rock experience suggests that the first 'solution' is a non-starter: the fact that depositors are also voters means that it usually pays to bank on a bailout as the most likely outcome. This places the policy emphasis for reducing moral hazard on tougher supervision.⁴⁴

- Capital, liquidity, transparency and ratings

Another important subset of lessons about regulation and supervision relates to the treatment by regulators of banks' capital and liquidity positions, and regulators' attitudes towards ratings agencies and complex financial instruments.

Perhaps most obviously, the TLA crisis is likely to see at least some rethinking of the regulatory treatment of banks' capital requirements, and how they relate to off-balance sheet activities. Regulators require banks to hold enough capital to cover the expected losses they will make on their activities, and a major consequence of the move to an originate-and-distribute model was that regulators were prepared to allow banks to hold a smaller amount of capital relative to the volume of loans they were creating. Indeed, from the banks' point of view, this was a key motivation for many of these transactions. From the point of view of the regulators, the hope was that, since the process involved banks selling their risk on to other investors, this would make the banks less vulnerable. But the TLA crisis suggests that the banking sector hadn't really managed to get rid of all of this risk after all. Partly this was because the banks had bought loans from each other as investors, but more importantly it was because it turned out that the SPVs – which were supposed to be separate from the banks that had created them – were in fact still linked back to their parent banks thanks to a combination of reputational risk and the provision of liquidity lines. This meant that, when the crisis broke, much of the risk effectively moved back on to banks' balance sheets (the 're-

⁴⁴ Another possible solution that is often canvassed in the aftermath of banks runs and the subsequent public bailouts is a shift to so-called 'narrow banking'.

intermediation' described earlier). It follows that capital requirements, and in particular capital requirements for SPVs, could now be adjusted upwards.⁴⁵

Traditionally, banking crises have involved problems on the asset side of the balance sheet, when a macroeconomic shock (such as the bursting of an asset price bubble) leads to a sharp rise in problem loans. And this mechanism was indeed at work in the TLA crisis, with the problem centred in the US housing sector. Yet, from the point of view of the banking system, the scale of bad loans at the time of writing has actually been rather small relative to the total size of bank assets. Instead, the problem that occupied the minds of policymakers turned out to be on the liability side of banks' and other financial institutions' balance sheets, as these institutions faced funding problems once banks started to hoard cash. Regulators will therefore be inclined to pay more attention to liquidity and funding risk in the future, relative to the traditional focus on capital.⁴⁶

Finally, the modern approach to regulation and supervision as sketched out in the Basel II Accord places a fair amount of faith in the role of ratings agencies, and of banks' internal risk modelling. The TLA crisis suggests that some of that faith may turn out to be misplaced.⁴⁷

(iii) Lessons about central bank policy

The third and final set of lessons from the TLA crisis covered in this paper relates to lessons about central banks and monetary policy.

- Central banks and asset prices

First, and perhaps most importantly, the TLA crisis will provide new fuel for the ongoing debate over whether central banks need to pay more attention to asset prices relative to standard inflation measures, and more specifically, whether they should seek to target the former, as well as the latter.⁴⁸ Certainly, one implication of the kind of arguments advanced in Part two of this paper is that since periods of low inflation are not sufficient to generate financial stability, there is a case for policy to react to emerging financial imbalances even

⁴⁵ Gillian Tett, Back on the books? Regulators start rethinking their rules on banks. *Financial Times*, 20 September 2007.

⁴⁶ Plender, Remember liquidity at Basel.

⁴⁷ On models, see for example Gillian Tett and Anuj Gangahar, Limitations of computer models. *Financial Times*, 14 August 2007.

⁴⁸ On the merits of central banks seeking to burst asset bubbles, see Nouriel Roubini, Why central banks should burst bubbles. *International Finance* 9 (1) 2006 and Adam Posen, Why central banks should not burst bubbles. *International Finance* 9 (1) 2006.

when traditional inflation measures remain subdued. In the absence of such a stance, the presence of an asymmetry in the central bank's policy actions – a reluctance to tighten policy when a bubble is inflating, combined with a willingness to loosen when the bubble is deflating – will build some problematic incentives into the financial system. Hence the common accusation that the US Federal Reserve has been a 'serial bubble blower', for example, and the arguments for the existence of a 'Greenspan (and possibly now Bernanke) Put'.⁴⁹

Still, the problems of explicitly targeting asset prices are also well known. This dilemma is covered rather nicely in the sixth lecture in the 2006 Boyer lectures delivered by Ian Macfarlane.⁵⁰ Macfarlane accepts the argument that the evidence does not support the view that low inflation will prevent booms and busts developing in asset markets, and that it follows that there is a policy question as to what a central bank should do if it suspects that a potentially unsustainable asset bubble is in the process of forming. But he also notes that *even if* a central bank can correctly identify an emerging bubble, then the bluntness of the monetary policy instrument (higher interest rates will not just influence activity in the targeted sector, but will hit the economy as a whole) and the public fallout from acting (for the average punter, the central bank might look like it's seeking to destroy their wealth, hardly a proposition designed to reconcile voters to central bank independence) would *still* make the decision extremely problematic. Macfarlane also points out that it is *not* the case that asset prices are completely ignored in the current inflation-targeting monetary policy framework, since their influence on the future path of activity and conventional inflation is taken into account when setting policy. This was the case in Australia in 2002 and 2003 when the RBA hiked interest rates during our housing price boom. Note that there are two distinct channels here. First, there is the impact that asset price changes have on the future path of (forecast) inflation, which should be explicitly taken into account by an inflation-targeting central bank. Second, there is the impact that they have on real activity, which will be a factor for those central banks that have an output target.

⁴⁹ Martin Wolf argues that while the Fed can indeed be accused of being a serial bubble blower, this reflects in part the exceptional circumstances of the global savings glut. Martin Wolf, The Federal Reserve must prolong the party. *Financial Times*, 21 August 2007.

⁵⁰ Macfarlane is the former governor of the Reserve Bank of Australia. See Lecture 6: Challenges for the future in Ian Macfarlane, *The search for stability. Boyer Lectures 2006*. Sydney, ABC Books, 2006. Especially pp 109-115.

- Structured finance and monetary conditions

Second, the innovations of structured finance turn out to have been significant enough to have affected overall monetary conditions. Securitisation in particular represented an effective easing in lending conditions, by increasing the amount of loans that banks could make for a given amount of capital. Central banks may have failed to fully take into account the way in which this increase in the capacity of banks to lend meant that, for a given interest rate stance, monetary policy was looser than it had been in the past.⁵¹

- New, old bank runs

Another important lesson for central banks (and for regulators) is that the basic problem that makes banks vulnerable to runs – the mismatch between borrowing short-term to fund investments in illiquid or long-term assets discussed earlier – has not been abolished in the new financial system. Instead, a growing number of (often unregulated) bank-like institutions have become vulnerable to the ‘21st-century version of bank runs’.⁵² Thus financial institutions playing in the ABCP market turned out to be vulnerable to a very similar risk to old-style banks: they had been funding themselves by issuing short-term paper and investing the proceeds in longer-term, sometimes illiquid, assets. When investors decided they no longer wanted to roll over the short-term paper, spooked by valuation fears and ratings downgrades, the institutions found they were squeezed much like a bank would be by a depositor panic.

- Of moral hazard, smoking in bed, fire brigades, and playing chicken

Finally, one of a central bank’s key roles is to stand by to act as lender of last resort in the case of a run on the financial system that is of a scale big enough to threaten the system itself; in effect, to bail out the market: ‘Economists think they know how to handle financial crises: throw money at them and after the crisis is over, mop the money up.’⁵³ But the public good that is the lender of last resort function carries with it the moral hazard problem; namely, that the prospect of a central bank bailout might undermine the incentive for responsible behaviour on the part of the financial sector.

⁵¹ This point is made in David Dodge. Turbulence in credit markets: causes, effects and lessons to be learned. Remarks by David Dodge, Governor of the Bank of Canada, to the Vancouver Board of Trade. Vancouver, British Columbia, 25 September 2007.

⁵² Paul Krugman, It's a miserable life. *The New York Times*, 20 August 2007. See also Floyd Norris, A new kind of bank run tests old safeguards. *The New York Times*, 10 August 2007.

⁵³ Kindleberger, *Manias, panics and crashes* p. 214.

It is not surprising, therefore, that the decision by the US Fed and the ECB in August 2007 to respond to the risk of a looming credit crunch by pumping billions of dollars of liquidity into the system, (followed by a Fed rate cuts later in the year) raised concerns that they were creating moral hazard, by bailing out financiers who had made irresponsibly risky bets on financial instruments they did not really understand.⁵⁴

Some observers have argued that the theoretical moral hazard argument is overdone when it comes to judging what a responsible policy response should be for a central bank under these circumstances. Larry Summers, for example, goes back to the original concern about moral hazard in insurance markets to note that the theory is that the holder of a fire insurance policy will take less care with respect to avoiding a fire. But, he continues, the prospect that people might smoke in bed when they shouldn't is *not* a good argument against the existence of fire departments.⁵⁵ Central banks have to act to stabilise the financial system: when there is a fire, they must put it out.

Initially during the TLA crisis, the Bank of England seemed to be erring on the side of worrying about the moral hazard implications of intervention, arguing that it did not want to reinforce speculative behaviour. But shortly after publicly arguing against the case for bailing out investors, it found itself having to intervene in response to the Northern Rock crisis.⁵⁶ As the *Financial Times*' Martin Wolf put it, the Bank had engaged in a game of chicken with financial markets, and lost.⁵⁷ The Bank's governor, Mervyn King, continues to argue that the Bank was right to be worried about moral hazard. Using the same analogy as Summers, he concedes that the fire service has to put out the fire once it happens. However, he goes on to caution, fire services certainly do not offer free insurance for people who smoke in bed or set fire to their own houses, and thereby encourage them to take risks that will endanger others.⁵⁸ Unfortunately, as the Bank of England's own experience suggests, there does not appear to be a satisfactory answer to the trade-off involved here.

⁵⁴ See for example Carter Dougherty, Moral hazard or responsible behaviour? *International Herald Tribune*, 18 September 2007.

⁵⁵ Lawrence Summers, Beware moral hazard fundamentalists. *Financial Times*, 23 September 2007.

⁵⁶ Julia Werdigier, Bank of England, in about face, injects cash into money markets. *International Herald Tribune*, 19 September 2007.

⁵⁷ Martin Wolf, The Bank loses a game of chicken. *Financial Times*, 20 September 2007.

⁵⁸ King. Speech by Mervyn King, Governor of the Bank of England, at the Northern Ireland Chamber of Commerce and Industry.

Conclusion

At the time of writing, the TLA crisis continued to rumble on, so some of the final lessons from this episode may well fall into the ‘still to be learned’ category. That said, the experience to date does allow us to draw some preliminary conclusions.

First and most important is the point that is summarised above by the phrase *It's never different this time*. Despite the success in taming inflation and output volatility – the so-called Great Moderation – the world economy remains vulnerable to financial crises. Indeed, it seems likely that this vulnerability has increased in recent years as a by-product of financial liberalisation.

Second, the TLA crisis has taught us that, despite their many benefits, there are also important risks and vulnerabilities associated with the use of structured credit instruments, relating to their complexity and opacity, and in particular to the incentive problems that they have generated.

Third, there have been important lessons for regulators and supervisors regarding the importance of liquidity risk, the treatment of off-balance sheet vehicles, the limitations of banks' internal risk modelling, the dangers of excessive reliance on the ratings agencies, and the coordination problems generated by the UK's tripartite system.

Finally, there are messages for central bankers both in regard to their role as lender of last resort in an era where new style bank runs seem to be set to replace the older version, and in terms of the growing need to take asset prices into account when setting monetary policy.

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