BANK OF ENGLAND

Speech

Financial Innovation: What Have We Learnt?

Paper by

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Section 1: Introduction

1 At last year's conference, we presented a paper highlighting the profound impact of rapid financial innovation, deregulation and capital market integration on the performance, risk and management of the global financial system. We particularly noted the benefits of financial innovation.[1] We argued that the development of new financial instruments has created opportunities for households and corporates to improve their management of financial risks and has facilitated the smoothing of consumption and investment over time and across different states of the world. But we also emphasised that the breakdown of barriers to the supply of financial products and the large volume of risk pooling and shifting within and across borders has increased the network interconnections within the global financial system. That has added to the system's complexity. And we underlined that understanding and addressing the corresponding evolution of financial system risks poses major challenges for financial institutions and for financial stability authorities.

2 The past year has seen these potential major challenges turn into real practical problems. We are now almost a year into a credit crisis centred around a sudden evaporation of market liquidity for many structured credit products that rapidly spilled over into wholesale bank funding markets and beyond, given a complex web of interconnections.[2] So it is an opportune moment to review whether the financial innovation of recent years that created such structured products has indeed been a positive force, as argued by Alan Greenspan[3], for example, or whether financial innovation has been a malign development, producing "financial weapons of mass destruction" in the words of Warren Buffett[4]?

3 There is clearly some force in both arguments. On balance, we continue to see considerable benefits to households and corporates from the broadening of choice in financial products and from improvements in the completeness of financial markets.

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[1] "Innovation and Integration in Financial Markets and the Implications for Financial Stability", Rob Hamilton, Nigel Jenkinson and Adrian Penalver, pp. 226-250, The Structure and Resilience of the Financial System, eds Christopher Kent and Jeremy Lawson, Reserve Bank of Australia, November 2007.

[2] See for example, the Bank of England *Financial Stability Report*, October 2007 and the Bank of England *Financial Stability Report*, April 2008.

[3] See for example World Finance and Risk Management, delivered at Lancaster House 25 September 2002.

[4] Referring to derivatives in the Berkshire Hathaway Inc. 2002 Annual Report.

But equally, the severe pressures and strains of the past year have highlighted the pervasiveness of some market frictions that have a major bearing on system-wide behaviour and dynamics, amplifying and transmitting shocks. Action to lower these frictions is consequently important to capture the full benefits of innovation and to ensure that these are durable.

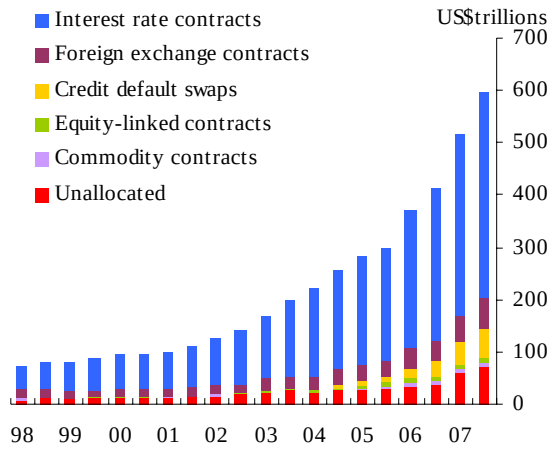
4 This paper explores these issues further. Section 2 provides a short reminder of the staggering extent of financial innovation in recent decades. Section 3 sets out the theoretical vision of how financial innovation offers the potential for substantial improvements in the capability of corporates and households to manage financial risks. Section 4 highlights the obstacles to fulfilment of that vision given the imperfections in financial markets. Lessons for the future and possible policy responses are discussed in Section 5, while Section 6 concludes.

Section 2: Trends in financial innovation

5 The pace of change in financial markets in recent years is truly remarkable. A few statistics help to illustrate this point and set the scene:

- The outstanding value of interest rate swaps and other derivatives reached almost $600 trillion or some 11 times annual global GDP by the end of 2007, according to the BIS. Ten years ago the value was around $75 trillion (2 ½ times GDP) (Chart 1). The global derivatives market expanded almost 50% during 2007.

Chart 1 Outstanding Notional Amounts of Derivatives



Source: BIS.

- The credit default swap (CDS) component has experienced explosive growth. The outstanding value of CDS contracts has surged to more than five times the outstanding principal of global corporate bonds by the end of 2007. Yet only three years' ago, at end-2004, the CDS market was only some 85% of the size of the corporate bond market. The CDS market is now by far the more liquid market for trading credit risk.

- The outstanding value of commodity derivatives outstanding has risen from around $400 billion in 1998 to $9 trillion at the end of 2007.

- Options markets have also grown very strongly. For example, the outstanding principal of interest rate options has increased from $8 trillion to $57 trillion in the past decade.

- Innovation and the removal of barriers to cross-border activity has spurred global capital market integration. For example, turnover in foreign exchange markets has tripled since the BIS survey in 2001. And cross-border asset holdings have outpaced the strong growth in the global stock of financial assets.

- Markets offering investors ready-made portfolios rose very rapidly in advance of the credit crisis. Issuance of asset-backed securities (ABS) globally was $1460 billion in the first half of 2007, up from $425 billion 9 years previously. There was rapid expansion in the market for collateralised debt obligations

(CDO) from $75 billion in the first half of 2005 to $200 billion in the first half of 2007. And innovation spawned greater complexity. Investment banks launched a series of highly complex products such as constant proportion debt obligations (CPDO) and re-securitisations of CDOs and ABSs (so called CDO-squared and CDOs of ABS).

- Demand for such tailor-made products has plummeted over the past year, while other markets such as the corporate CDS market have continued to expand rapidly. A possible explanation and assessment of the implications is set out in the remainder of the paper.

Section 3: Financial innovation: a broadening of choice

6 A crucial function of the financial system is to help companies and households to manage risks. The discharge of this function depends on the type of financial products or contracts made available to companies and households to hedge and take on risk exposures in close alignment with their individual risk preference and tolerance, as well as the capability of the institutions that make up the financial system to manage the risk inherent in these products. The focus of this section is on how innovation in financial instruments extends the choice of risk management products available to companies and households, moving us closer towards a vision of liquid markets in state contingent securities. But it must also be borne in mind that imperfections within financial markets will affect the performance of these innovative financial products, that may in turn limit their availability. Such frictions may thus impact on the ability of the financial system to support corporate and household risk management. That is covered in section 4.

7 As an illustration of the potential benefits of innovation in contract design and broadening choice, consider the market for corporate credit risk. In previous decades, the only securities available to investors wishing to invest in corporate debt were corporate bonds. One might call such assets “natural assets” as the same instrument that is issued by the borrower is also that held by the investor. In this example, the role of the financial system is simply to facilitate the intermediation between end borrowers and end investors, and, in some cases, to provide a secondary market in the asset, intermediating between alternate end investors. There is no transformation of the asset.

8 Financial engineering can, however, decompose the returns on a corporate bond into different fundamental components or "atoms" of risk:

- For example, credit default swaps can be used to separate the return on a corporate bond into the compensation for default risk and the compensation earned on a risk-free security. An investor wanting to make an inter-temporal transfer without taking on any credit risk, for example, could then buy a bond and purchase credit default swap protection, thus retaining exposure to the cash flows on the risk free component of the underlying instrument. Synthetically, this expands the volume of low risk investment portfolios. On the other side, a market is created for those who specifically want to trade default risk which allows cleaner pricing of this dimension of risk. Efficient markets for each element should raise the efficiency of the corporate bond market as a whole, with attendant benefits for both borrowers and investors.

- Furthermore, because credit default swaps have different maturities, investors could, for example, buy the corporate bond and retain the resulting exposure to default risk in the near term. But they could also buy protection against default at longer horizons, about which they may be more uncertain.

- Moreover, nominal corporate bonds can also be separated into a nominal and inflation-linked risk component if the corporate also issues inflation-indexed bonds. Investors can utilise these instruments to buy or sell protection against exposure to inflation risk.

As noted above, the markets for single-name corporate credit default swaps have become more liquid than the underlying bonds given the flexibility and specificity they provide to end-investors.

9 The underlying components of risk can, of course, also be recombined by financial engineering to create new financial products with different risk characteristics. Extending the above example, single-name credit default swaps have been pooled together into standardised indices. That creates a synthetic market in generalised corporate credit risk, enabling investors wishing to hedge or establish a new position linked to macro-economic risk to do so. And there are many parallels such as products tracking equity indices or commodity prices or emerging market debt to name but a few.

10 The value of standardised indices to financial intermediaries can be illustrated by considering a credit default swap dealer, who may find at the end of a day's trading that they have been a net seller of default protection on several dozen corporates. The dealer could hedge such a position by buying protection on the standardised indices. The hedge would of course not be perfect as in all likelihood the firms in the standardised indices would not be an exact match to those whom the dealer had sold protection. But because indices are relatively liquid and thus cheaper to trade, the dealer may decide that the resulting saving in transaction costs may outweigh the residual 'basis' risk that results from the hedge being imperfect. And through competition, the benefit would tend to be shared by corporate borrowers and investors in corporate credit risk.

11 Taking the example further, investors who wish to take exposure to generalised corporate credit risk but who wish to limit their potential losses can do so through trading options contracts on the standardised indices. The array of options with different "strike prices", which represent the thresholds beyond which the options do or do not pay out, allows market participants to express opinions about the distribution of possible future aggregate corporate conditions.

12 Credit default swaps are not the only way an investor can engineer a targeted exposure to credit risk. Alternatively, an investor can take a position on corporate credit risk by purchasing a securitised product such as a collateralised debt obligation (CDO). In this case, a pool of assets such as corporate bonds is created and the payment streams produced by these are allocated to different classes or tranches depending on the default experience. This allows investors to take positions on the scale of default losses in the underlying asset pool.

13 Stepping back, the extended example above highlights how financial engineering has facilitated the decomposition of corporate credit risk into different subcomponents and the recombination of these subcomponents into new financial products with different risk characteristics. There are many other examples across the financial system. The consequent broadening of the range of financial products has improved choice and the matching and tailoring of products to customer needs. For instance, the ability of non-financial corporates to manage their risks has been transformed by their increasing use of derivatives to hedge interest rates and currency risk as well as their exposures to commodity prices. And notwithstanding the current squeeze on the

availability of credit (and withdrawal of many products), households have also benefited from a significant expansion in the range of saving and borrowing products compared to the position 20 years ago.

14 The practical examples described above clearly demonstrate the benefits of financial innovation. Enhancing the capability to transform and transfer risk, and thus improving the matching of the supply of risk products to the demands of end investors offers the prospect of lower risk premia and greater financial efficiency. And that in turn should lower the cost of capital for firms and improve the ability of households to smooth their lifetime consumption and to insure against unexpected outcomes.

15 Taking an even further step back, there is a beguiling vision of financial innovation taking us closer towards a world of more complete and efficient markets for state-contingent contracts. The ability to decompose and trade the distribution of many dimensions of fundamental risks creates a potential lattice of efficient risk prices which can then, by arbitrage, be used to price efficiently the combinations of these risks embedded in "natural assets" and in "synthetic assets" structured to meet investor demand.

Section 4: Frictions and Market Imperfections

16 The previous section described how financial innovation has widened the range and choice of financial products available to corporates and households to facilitate improved risk management. But it also noted the potential importance of market imperfections and frictions in the provision of such contracts. One year on from the onset of the current credit crisis, what have we learned about the performance of the financial system and such market imperfections?

17 Looking broadly, an important lesson from the past year, is that these frictions appear more powerful than market participants and financial authorities previously judged. They pose substantial barriers and practical limitations to the achievement of a stylised vision of full, complete, and efficient markets in fundamental components of risk. Five areas of potential weakness are highlighted in turn: incomplete information; alignment of incentives; liquidity in financial markets; robustness of market infrastructure; and system dynamics.

Incomplete information

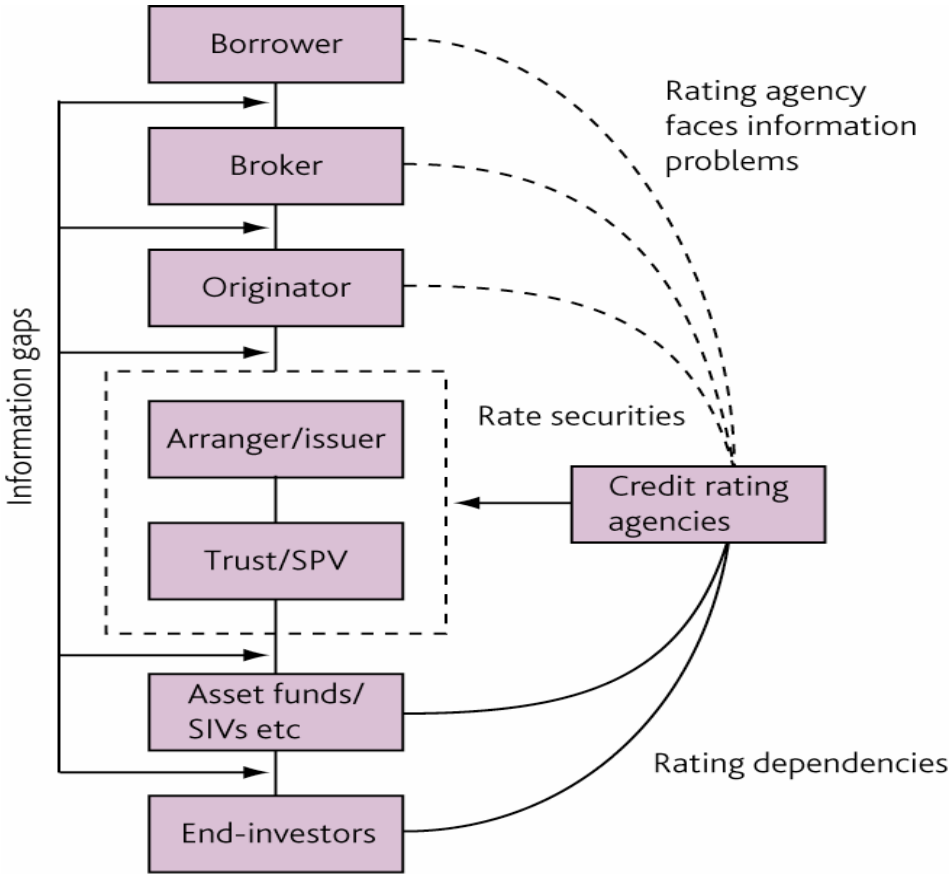
18 The vision of a world of complete and efficient markets for risk depends on full information. This full information requirement sounds deceptively simple but is actually extremely onerous. An investor needs to know the mapping between states of the world and the pay-offs they would receive in each state as well as the likelihood of these states of the world materialising. This means not only understanding the details of highly complex contracts but also the effects of the interplay between exposures and contracts of all the other agents in the economy. So not surprisingly, many of the problems that have occurred over the past 10 months have arisen out of incomplete and asymmetric information. There are a number of dimensions.

19 First, it is very difficult to ascertain the pay-off distribution for many instruments. For example, a mezzanine CDO tranche might have attachment and detachment points of say 7% and 10%, meaning that for losses on the underlying collateral of less than 7% they continue to pay out at par, but become worthless when losses reach 10%. The pay-offs to such instruments are therefore highly sensitive to quite minor changes in expected credit conditions. In a full-information world with known probability distributions, instruments with such highly sensitive pay-offs are no more difficult to price than any others. But when lack of complete information makes the future uncertain, in a Knightian sense, contracts with highly sensitive pay-offs to slight changes in credit conditions become increasingly risky. Moreover, innovative instruments inherently will not have a long run of performance data. Those seeking to summarise their likely performance using statistical metrics based on limited data and drawn from very benign circumstances have a very difficult task. Many investors in RMBS and ABS CDOs linked to US sub prime mortgages have been surprised by the extent to which the performance of these instruments has fallen short of even their worst expectations. Securities with complex pay-offs, therefore, are highly vulnerable to increased macroeconomic uncertainty.

20 Second, information loss is built into the securitisation process because of the separation between the originator of the loan and the end investor. Chart 2 illustrates how information is lost at every step in the chain of risk transfer. To some extent, holding a diversified pool of underlying loans acts as protection against a lack of information about idiosyncratic risk. But the experience of the past year has shown

that diversified pools and seniority in the tranche structure may not provide adequate protection against highly co-ordinated or ‘systemic’ risk.

Chart 2 – Information Loss



Source: BIS Committee on the Global Financial System

21 Many investors had, of course, also delegated their monitoring responsibility to credit rating agencies. This offered, potentially, a very significant efficiency gain. Rather than many investors paying privately to be moderately informed – with corresponding substantial replication of investment analysis - credit rating agencies were paid to be well informed and to make this information public. But we now know that rating agencies were also unable to overcome these same underlying information problems and have been forced to make multiple down-grades to many of their ratings of structured credit products and to modify the models they use for ratings. A major problem for the market as a whole has been that once investors collectively lost trust in rating agencies, the next most informed participants in the market were a long way behind. As a result, there was a step-change down in the level of confidence in the

likely performance of these assets and a consequent system-wide increase in the risk premia required to hold such assets. With hindsight, information generation and processing was too reliant on a limited number of rating agencies, and there was too much confidence in the ability of individual rating agencies to solve the highly complex information problems underlying some securities.

22 Third, it is very hard to determine counterparty credit risk for state-contingent securities. In a world of full information, the state-contingent survival of counterparties would be known and nobody would accept contracts from those who could not honour them – at least not without a substantial price discount by way of compensation. But when investors cannot know the full network of exposures in the financial system, it is extremely hard to estimate where the ultimate incidence of losses from an extreme shock will occur. The failure of your counterparties' counterparty can shift you up the queue of potential losers quite quickly. Moreover, the fear of potential counterparty risk itself quickly affects the behaviour of individual firms and thus leads to a collective lowering of risk appetite.

23 These problems are potentially the most acute for what might be called tail-risk products. During the boom, tail-risk products, like deeply out of the money options, seemed an easy way to make money. The protection seller could collect a steady stream of premia with the extremely unlikely prospect of having to make a very large payment. Since these sorts of contracts offer "deep" insurance, it is important to the system as a whole that they are held by the most robust institutions. Here, the theory of risk transfer was that risk would be re-allocated to those most able to bear it. In practice, though, those most willing to take these risks have in some cases turned out to be those who understood the risks the least and thus were prepared to take it on at too low a price. This problem is extremely hard to guard against because of the difficulty in determining whether a counterparty who is insuring you against risk (or a chain of counterparties) fully understands what they have taken on and have the capacity to make good on their commitment in adverse states of the world. In recent months, banks have been forced to write down the value of contracts that they had bought from monoline insurers to guarantee the payments promised by their holdings of highly-rated CDOs linked to US sub prime mortgages. With the likelihood of such guarantees being called upon appearing very small, the monolines wrote a large volume of such guarantees. But more recently, this prospect has become a distinct

possibility, and one that threatens the viability of some of the monoline insurers, and thus their perceived ability to pay.

Incentives

24 These information problems are difficult enough when risk is treated as exogenous. And in a world of full information, 'nature' can be the only source of uncertainty. But in practice when there is a lack of information and uncertainty about actions, the incentives facing individual actors become very important and can lead to endogenous risk creation within the financial system.

25 These incentive problems have been clearly apparent in risk transfer markets. As has been widely described elsewhere, if loan originators do not have sufficient capital at stake, they will not screen potential borrowers adequately.[5] In the US sub-prime mortgage market, rewarding loan originators by volume of issuance was a recipe for lax credit assessment standards. But even when originators seem to have an economic stake in performance, for example by holding some of the 'first loss' or equity tranche of a securitisation, this is not sufficient to guarantee incentive compatibility, as it is possible to hedge the exposure to the equity tranche through a separate market transaction.

26 There is, though, also a more subtle problem. As mentioned above, holding a diversified pool provides protection against idiosyncratic risk. But the absence of a concentrated exposure can also limit the incentive to monitor individual loans, and thus the pooling of risk may lead to a reduction in the overall level of risk screening *ex ante* and monitoring *ex post*. It was the combination of these misaligned incentives that proved such a problem in the US sub-prime mortgage market. Individual end-investors had little incentive to monitor the performance of loan originators, perhaps presuming that originators had sufficient stake in the securitisation to provide market discipline. Issuers, though, transferred much of the risk and did so comprehensively, as they needed to demonstrate that they had transferred risk irrevocably before they could get capital relief. But in the absence of adequate monitoring, originators could chase volume at the expense of lending standards.

[5] See for example, the Bank of England *Financial Stability Report*, October 2007.

27 Therefore, two elements at the heart of the benefits of financial innovation – the ability to pool and transfer risk – contributed to an endogenous increase in the level of underlying credit risk.

28 There is also a potential incentive problem arising from the separation of legal ownership from economic exposure – although this is at the moment a possible difficulty for the future. Credit default swaps transfer the risk of economic loss to the seller of protection but the right to trigger covenants or put a firm into administration remains with the underlying asset holder. A protected asset holder, therefore, has little incentive to monitor a company closely and trigger covenants or force it into administration at the first signs that its business may have become unsustainable. And the seller of protection lacks an alternative legal remedy. Companies may therefore continue to operate for longer than they did in the past once they get into trouble. So, the use of credit default swaps may reduce the probability of default but increase loss given eventual default.

Liquidity

29 These problems of incomplete information, and misaligned incentives have had a major impact on the market liquidity of innovative financial instruments.

30 As described above, misaligned incentives in origination and distribution allowed the provision of sub-prime mortgages to households with very little prospect of repayment and significant vulnerability to modest changes in economic circumstances. So any investor trying to estimate the distribution of likely future delinquency rates amongst sub-prime borrowers would not only have to consider the range of macroeconomic outcomes but also how much this effect would be amplified by poor credit risk screening. This would be an extremely difficult variable to quantify. But because of the sensitivity of complex securities to small changes in loss rates, differing judgements about the quality of risk screening could make a material difference to the value of the instrument. The recognition that risk screening and the availability and quality of information on the performance of complex products was significantly weaker than previously anticipated, as for example investors lost confidence in the quality of credit ratings, led to a substantial increase in the risk premium required to hold such assets. These effects made the valuation of assets

extremely uncertain and contributed to the rapid evaporation of secondary market liquidity.

31 There is also an important and fundamental tension between the capability of financial engineering to tailor financial products to meet individual investor demand more effectively and secondary market liquidity. The more closely a specific financial instrument is matched to the risk preferences of an individual investor, the harder it is to find another investor willing to trade that exact instrument in the event of a shock to those risk preferences.

32 In other words, the improved matching of risk to an individual's risk profile has given rise to an increase in basis risk within the system. As one illustrative example, any investor wishing to hedge any exposure to the US sub-prime mortgage market over the past year or so would have little alternative but to trade in the standardised ABX indices (which themselves have often been relatively illiquid) rather than in the specific instrument they held. The developments over the past year have illustrated that hedges have often provided less effective than envisaged, and that there was a significant under-pricing of the inherent basis risk of many innovative structured instruments at the point of origination, given the lack of secondary market liquidity for such specific risk. Looking forward, it is quite likely that there will be greater unbundling of complex instruments into standardised components that are likely to be liquid and readily traded with low transactions costs, and bespoke elements that will command a higher risk premium given their inherent illiquidity.

Strengthening financial infrastructure

33 Because of the specificity of the risk, innovative financial products are rarely exchange traded. Non-standardised products require the services of a broker-dealer to trade. But over the counter (OTC) trading is vulnerable to many operational risks. In particular, investors are exposed to the default of the major broker-dealer counterparties. This was a significant concern to counterparties of Bear Stearns when it was in distress before being taken over by JP Morgan. To moderate such concerns in the future, private sector initiatives are being developed to introduce a central clearer to the CDS market. Such initiatives are very welcome. Although the net positions of CDS dealers generally represent only a very small fraction of their gross positions, because these gross positions have grown so rapidly in recent years, inter-

dealer positions can sometimes be very significant – even after netting. A central clearer that would offset any long bilateral positions that one bank had with another with any short positions that the same bank had with a third bank, could significantly reduce the counterparty risk in the CDS market. A leading proposal at present is centred on the Clearing Corporation, which is jointly owned by eleven major banks and other trading platforms.

34 Counterparty risk, as described above, is particularly corrosive for liquidity in financial markets. Investors become concerned not only with the soundness of their immediate counterparties but their counterparties' counterparties, and so on. When risk crystallises it can be unclear which financial institutions have been adversely affected. As a result of limited disclosure and transparency, investors may limit the supply of funds to a much broader array of counterparties than necessary. This helps to explain why all banks found it more difficult to raise funding when the deterioration in the performance of sub prime assets became apparent, even though it would later be revealed that some banks were more exposed than others.

35 A further challenge is that the markets for innovative financial instruments can grow very rapidly, outstripping the capacity of back offices to keep up with trading. Towards the end of 2005, CDS trading had run ahead of the processing of trades to the extent that the major CDS dealers on average had unconfirmed trades outstanding that were equivalent to a couple of weeks of trading volume. If the reference entities underlying these CDS trades had defaulted, it would not have been clear – at least for some time – who was owed money by whom. The international authorities then set the major CDS dealers targets to reduce volumes of unconfirmed trades, which subsequently fell significantly. But a backlog of unconfirmed trades did start to cumulate again during the early months of the recent financial turmoil, although this has also diminished over the past six months. Furthermore, the proportion of new CDS trades that are confirmed electronically and hence immediately has increased sharply from around 50% when concerns were raised in 2005 to over 90% at present.

36 It is also important that innovative financial products are documented sufficiently carefully and that their risks are accurately communicated to potential investors. The more complex the instrument, the greater the scope for misunderstanding. Investors have recently incurred significant losses on complex securities like CDOs and a number are expected to sue for mis-selling. HSH Nordbank is already suing UBS for

the mis-selling of CDOs, for example, and Banca Popolare di Intra has a lawsuit against Bank of America for the same reason. Wingecarribee Shire Council is also suing Lehman Brothers for the mis-selling of CDOs.

System dynamics and the amplification of shocks

37 The frictions of incomplete information, imperfect incentives and inherent illiquidity of bespoke financial instruments may also be amplified by adverse dynamics within the financial system itself. For example, poorly-designed remuneration structures and short-term performance targets may encourage 'herding' behaviour within the financial system that raises the costs of taking a contrarian view. And there are also well-documented concerns that regulatory design pays insufficient attention to the risk of procyclicality[6].

38 It also appears to be the case that many firms failed to take sufficient account of the likely behaviour of other firms, and thus of system properties, when designing stress tests and contingency plans. They were far too confident in their ability to exit or hedge positions in high risk instruments, where trades were highly crowded, and were consequently under-prepared for the evaporation of market liquidity.

39 Moreover, there are some financial instruments (such as mortgage-backed securities where the mortgages have prepayment options), where the dynamic hedging behaviour of holders can amplify the price movement, as dynamic hedging can lead to additional short hedging positions being required after a price fall. With individual institutions being small relative to the market, each individual institution may think that their new short position will have little or no impact on market prices. But collectively, the aggregate demand for new short positions is likely to drag prices further down and amplify the original shock, generating additional losses for those who were slower to update their dynamic hedging[7].

[6] See for example, Borio, C., Furfine, C and Lowe, P "Procyclicality of the financial system and financial stability: issues and policy options" BIS paper 1, March 2001 and BIS Annual Report: The unsustainable has run its course and policymakers face the difficult task of damage control, 30 June 2008.

[7] See Box 9 – Market dynamics and options selling, pp. 60-61, Bank of England *Financial Stability Review*, June 2005.

Section 5: Some lessons and policy responses

40 We are now around a year into a severe credit crisis centred on many of the complex structured instruments described earlier. An immediate behavioural response of risk managers in major financial institutions has been to pull out of these markets entirely. This has dramatically reduced primary and secondary market liquidity and increased price volatility, further reducing incentives to invest in these instruments. The short term outlook for many of these innovative instruments is poor. And as described in section 4, the past year has revealed that market imperfections and frictions are more potent than was previously thought. It is clear that there are important limitations on the capacity of the financial system to deliver all of the benefits of financial innovation spelled out in section 3. But equally it would be wrong to jump to the opposite extreme, given there are clearly major welfare gains from improved choice of financial products and better matching of risks.

41 So what are some of the lessons for financial innovation? What will the landscape look like in 5-10 years' time, once the dust has settled and institutional changes can be implemented to address the frictions identified? What if anything can policy do to facilitate or expedite this process of adjustment?

42 A first observation is that it is important to distinguish between different financial products. As shown in Table 1, there has been a huge dispersion in activity in different innovative products over the past year. For example, the corporate CDS market grew by 36% in the second half of 2007 and appears to be underpinned by strong demand. Other derivative and option markets have also continued to grow very rapidly. But on the other hand, new issues of corporate CDOs, CLOs and ABS CDOs have virtually completely stopped. Complex structured products with a high premium on information requirements and with a high bespoke element have thus fared much worse than simpler innovative instruments where there is more natural two-way trading and liquidity. Moreover, it is important not to lose sight that the success of some products and failure of others is a standard feature of the innovation process and of a competitive economy.

Table 1 Growth of selected financial markets (per cent)

OTC derivatives (notional principal outstanding)			
	98H1 - 07H1[(a)]	07H1 - 07H2	
FX forwards and swaps	8.1	18.8	
FX options	11.0	8.0	
Interest rate swaps	28.1	13.7	
Interest rate options	23.4	8.9	
	05H1 - 07H1[(a)]	07H1 - 07H2	
Credit default swaps	17.2	36.0	
Asset-backed securities (issuance)			
	98H1 - 07H1[(a)]	07H1 - 07H2	07H2 - 08Q1[(b)]
Non-agency RMBS	15.7	-67.4	-67.5
CMBS	25.0	-40.9	-93.8
Auto loans	7.8	-32.5	-17.1
Credit cards	6.7	-9.8	19.0
Student loans	12.0	-56.9	-34.2
Collateralised debt obligations (issuance)			
	05H1 - 07H1[(a)]	07H1 - 07H2	07H2 - 08Q1[(b)]
Corporate CDOs	121.0	-46.0	-92.1
CLOs	42.5	-56.9	-74.4
ABS CDOs	38.7	-68.2	-85.2

Sources: BIS, Dealogic and SIFMA.
(a) Annual growth rate.
(b) Growth of annualised issuance.

43 It is vital that market forces should be decisive in determining which instruments live or die. Regulators and supervisors should try to make the playing field as level as possible and certainly be on the look out for regulatory distortions which unduly favour the creation of particular products or limit the creation of other welfare-improving innovative instruments. But the market place should decide which products match issuer and investor desires once all risks are correctly priced.

44 Looking into a crystal ball what are some of our expectations for future financial market developments? We will put forward 7 suggestions:

- First, there will be additional focus on simpler, more standardised products. For example, it would be a surprise and probably undesirable if mezzanine resecuritisations were to reappear. Simpler products should be easier to understand and therefore less prone to radical changes in expectations of their likely performance. Improved stability of expectations should help sustain market liquidity during periods of stress. Standardised products also economise on information requirements and therefore also improve liquidity in secondary markets.

- Second, products will be more transparent in design and content, to improve the ease of monitoring and hence lower information costs. Increased transparency should not be confused with reams of data. The issuance documentation for many securitisations often contained a barrage of statistics. For CDOs of ABS, these documents could run to thousands of pages given that the documentation for each underlying ABS could already comprise of hundreds of pages. Any investor with the appetite to conduct due diligence would have found this volume of information completely indigestible. Products are likely to come with a broader range of standard expected performance statistics.

- Third, as already recommended by the Financial Stability Forum and the CGFS[8], rating agencies will supply additional information on the risk characteristics of rated securities and the sensitivity and uncertainty attached to their ratings. But there will also be increased recognition of the limitations and costs of any monitoring function for highly complex products. That, too, will support greater standardisation and transparency.

- Fourth, and relatedly, end-investors will demand more explicit rules governing acceptable collateral for securitisation and greater due diligence and risk sharing by originators and issuers. For example, strict definitions of prime/Alt-A/sub-prime mortgages will be required based on FICO scores, loan-to-value ratios and other characteristics. And originators will be required to report their exposure to the securities they issue. Contracts, for example, may require issuers to declare and maintain a significant stake in securitisations to align their incentives to screen and monitor loans.

- Fifth, investment banks will continue to offer tailored products to match specific risks. But there will be much greater recognition of the illiquidity and hence cost of the bespoke component. Equilibrium liquidity premia will be higher. That is likely to lower demand for such products, perhaps substantially.

[8] Report of the Financial Stability Forum on enhancing market and institutional resilience, 7 April 2008; Ratings in structured finance: what went wrong and what can be done to address shortcoming, CGFS Paper 32, July 2008

- Sixth, banks and other financial institutions will provide more information on exposures as pressures to improve market disclosure and transparency continue. And already regulators are assembling best practice accounting disclosures which should become standard reporting.

- Seventh, greater emphasis on standardisation of products may facilitate improvements in market infrastructure. Pressure will continue for more products to be traded on exchanges rather than OTC. That should also help control counterparty and other operational risks.

Section 6: Conclusion

45 Financial engineering facilitates the transformation and reshaping of risk. It thus supports the development of new products that decompose, transfer and pool risks to match user needs. Innovation thus delivers a broadening of financial choice that enables companies and households to improve their management of risk, with attendant gains in economic welfare.

46 There are, however, a number of frictions and market imperfections that lower the effectiveness of financial innovation. There may be insufficient information to gauge the risk in new financial instruments. And indeed information can get lost when a chain of parties are involved in the creation of new financial instruments. If these parties do not retain an economic interest in the performance of the instrument, its inherent risk can grow as incentives to screen and monitor weaken. In addition, the benefits of tailoring the risk profile to meet the demands of specific investors can be offset by the poor liquidity that might apply to a bespoke component. These frictions have become much more apparent during the credit crisis of the past year, during which time primary market issuance and secondary market trading of some innovative financial instruments has fallen sharply.

47 Looking ahead, however, ideas are being developed to lower some of the frictions from which innovative structured credit instruments in particular have suffered during recent months. Removal of these frictions will, in some cases, necessitate recognition of additional costs, for example in the screening of information and in the provision and cost of liquidity, that were severely underplayed in the earlier boom in financial markets. Recognition of these costs will, however, strengthen the resilience of the

financial system and underpin the durability of the manifold benefits from financial innovation.