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Promoting Financial System Resilience in Modern Global
Capital Markets: Some Issues

Speech given by Nigel Jenkinson at the conference, *Law and Economics of Systemic Risk in Finance*, University of St. Gallen, 29 June 2007¹

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The changing nature of risks

1 Spurred by rapid innovation, we are currently witnessing a period of major structural change in financial intermediation and the global financial system. Financial market activity is growing at a tremendous pace. For example, over the past five years, the credit derivatives market has grown spectacularly from around \$1 trillion notional amount outstanding in 2001 to around \$20 trillion in 2006 (Chart 1) and the issuance of leveraged loans has increased almost three-fold (Chart 2). The balance sheets of the major global financial institutions (the so-called large complex financial institutions or LCFIs) have more than doubled since 2000, fuelled by an increase in trading assets (Chart 3). Turnover in the UK and US foreign exchange markets has risen by around 50% in only the last couple of years. And capital market integration is rising rapidly as barriers to cross border flows have come down. Taking a longer sweep, over the past 35 years cross border asset holdings having risen more than six-fold in terms of world GDP (Chart 4).

2 Financial innovation has delivered considerable benefits. New products have improved the ability to hedge and share risks and to tailor financial products more precisely to user demand. That has enabled financial intermediaries and users of financial services to manage financial risks more effectively, and has lowered the costs of financial intermediation. And innovation and capital market integration have facilitated the wider dispersal of risks, which may have increased the resilience of the financial system to weather small to medium-sized shocks.

3 Innovation has also delivered new challenges and vulnerabilities. Dependence on capital markets and on sustained market liquidity has increased, as banks and other intermediaries place greater reliance on their ability to 'originate and distribute' loans and other financial products, and to manage their risk positions dynamically as economic and financial conditions alter. In turn that places additional pressure on the robustness of financial market infrastructure to handle large changes in trading

volumes and to cope with periods of strain. And the greater integration of capital markets means that if a major problem does arise it is more likely to spread quickly across borders. So as highlighted by a number of academics and authorities,³ the flip side to increased resilience of the financial system to small and medium-sized shocks may be a greater vulnerability to less frequent but potentially larger financial crises.

4 Benign economic and financial conditions in recent years have kept credit losses at low levels. Combined with buoyant returns from capital market activity, the profitability of major financial institutions has been strong. And capital levels are high. But as highlighted in Financial Stability Reports by the Bank of England and others, this benign environment has encouraged an increase in risk-taking and a ‘search for yield’ which has lowered the compensation for bearing credit risk and market risk to very low levels. The vulnerability of the system as a whole to an abrupt change in conditions has consequently increased.

5 Against this background, I would like to focus my comments today on some of the implications for the management and reduction of risks to the financial system as a whole. More specifically, how can the public policy goal of promoting systemic financial stability be best achieved? I will not provide a fully comprehensive answer to this question but will touch briefly on four aspects; improving the assessment of vulnerabilities that might threaten stability; developing appropriate buffers for capital and liquidity within the financial system that take due account of the changing nature of risks; strengthening the core market infrastructure; and lowering legal uncertainty.

Systemic stress-testing

6 As financial markets evolve and new vulnerabilities are exposed, it becomes increasingly important that both market participants and the public authorities improve their understanding and assessment of threats to financial stability, and take steps, where appropriate, to contain and lower them.

³ *Financial System Risks in the UK – Issues and Challenges* (John Gieve) (July 2006)
www.bankofengland.co.uk/publications/speeches/2006/speech280.pdf

7 The Bank of England has been active in the development of models to identify and assess potential sources of major vulnerability to the UK financial system⁴ and is, with the Financial Services Authority, engaged in a dialogue with practitioners, both to understand better current approaches to measuring risks under stressed conditions and to encourage improvements and the sharing of best practice in stress testing techniques.

8 Recent distress in the US sub-prime lending market, and the collapse of the hedge fund, Amaranth, have exposed weaknesses in risk management, including in the management of contingent, or off-balance sheet, exposures. Although developments in the sub-prime market of course continue to unfold, the impact on conditions in broader financial markets has to date been relatively contained. But, in a more severe stress scenario, perhaps in a more significant market such as corporate credit, or one in which several areas of vulnerability were exposed in combination, the impact could have more serious consequences for the financial system.

9 This highlights the potential value of a more rigorous assessment of tail-end risks. In particular, stress-tests by financial institutions should attempt to incorporate the behavioural responses of other firms which may have a substantial impact on market conditions. For instance, scenarios should take account of the extent to which many firms might respond to a common shock in a similar way, with potential implications for market prices or market liquidity. The likely amplification of price moves as financial institutions attempt to exit 'crowded' trades and liquidity dries up is an important example.

10 Indeed, given the importance of market liquidity for the efficient execution of banks' dynamic hedging strategies and for their activities in the wholesale funding and credit risk transfer (CRT) and securitisation markets, it is essential that stress tests factor in extreme, yet plausible, scenarios for liquidity conditions in these markets, recognising that market liquidity can evaporate very quickly, particularly for complex structured financial instruments. And it is also essential to factor in increased

⁴ *Financial Stability Report (April 2007)*
(<http://www.bankofengland.co.uk/publications/fsr/2007/fsr21.htm>) & FS Paper No.2: "A new approach to assessing risks to financial stability" (Haldane, Hall and Pezzini) (April 2007)
(http://www.bankofengland.co.uk/publications/fsr/fs_paper02.pdf)

liquidity needs linked to contingent calls, associated, for instance, with funding margin payments.

Capital and liquidity buffers

11 A sizeable buffer of capital and liquidity can help a bank to withstand a shock that threatens its solvency or would otherwise leave it with insufficient liquidity to meet its obligations as they fall due. But a bank's private choice as to the size of its capital or liquidity buffer may not be aligned with the socially optimal choice, as firms will not naturally take account of (or 'internalise') the implications of their distress or failure on the financial system more broadly – for example through the possibility of contagion to other firms and impairment of the financial intermediation system. That provides the justification for prudential regulation.

12 I will not dwell here on the value and importance of capital adequacy standards in containing systemic risks – enough has been written on the Basel Accord and Basel II, such that this is well understood.

13 However, consistent with my earlier comments on stress-testing and the importance of modelling behavioural responses, it is crucial the authorities understand banks' likely responses to changes in minimum capital requirements over the business cycle. In this regard, the Bank and the Financial Services Authority (FSA) have recently developed a framework for monitoring the potential for pro-cyclicality in credit conditions. The Basel Committee on Banking Supervision and the Committee of European Banking Supervisors are working on similar frameworks internationally.

14 Capital adequacy standards are usefully complemented by 'large exposures' rules. In particular, the application of such rules recognises the importance of addressing the risks from an unforeseen event that could cause a bank to incur serious loss, and that major problems could spill over from one bank to another given the network of interconnections. A European Union-wide review of the Large Exposures Directive is underway, offering the opportunity to improve the resilience of the financial system to such spill overs, including in the inter-bank market.

15 Rather less has been written about liquidity buffers and prudential liquidity standards. Given their balance-sheet structure, funding liquidity is a key risk for banks: the transformation of short-term liabilities into long-term assets leaves them structurally vulnerable to liquidity pressures. Banks therefore need to position themselves so as to be able to withstand extraordinary demands on their liquidity. If capital markets work efficiently, a solvent bank in need of liquidity should, in principle, always be able to rely on the market to obtain funds. However, in practice, the interbank market may not always work perfectly; asymmetric information and coordination failures are among the most severe potential frictions. Banks may, therefore, find themselves unable to access normal sources of funding liquidity. The measures to which a bank in this situation would have to resort, such as large scale asset sales, could have major adverse spill over effects through the system, as could the most extreme case of an outright failure to meet obligations as they fall due. Liquidity buffers may help in this regard: a bank holding a buffer of assets that is reliably liquid under conditions of stress, perhaps with a core component that is eligible as collateral at the central bank, should always be able to access liquidity in a way that avoids precipitating severe market disruption.

16 The trends described at the outset are also important here. First, a shift to greater reliance on wholesale funding and greater involvement in capital market activity more broadly perhaps makes banks more exposed to funding liquidity pressures than in the past: they are at the mercy of nimble wholesale lenders. And with internationally active banks managing multi-currency balance sheets, a local approach to liquidity regulation is becoming less relevant. It is for this reason that the Basel Committee for Banking Supervision decided to convene a Liquidity Working Group to take stock of prudential approaches internationally and to explore whether there is a case for greater consistency.

The critical role of infrastructure

17 The financial market infrastructure – exchanges and the systems used to clear and settle market trades or cash obligations – also plays a critical role here. Market participants rely on such infrastructure to implement their desired portfolio allocation;

to execute risk management strategies; to raise liquidity, both in normal course and in times of stress; and to manage contingent exposures and cash-flows. It is therefore important for financial stability that these systems function efficiently and continuously, and do not introduce unnecessary costs, risks or frictions to trading and post-trade processes. Frequent interruptions to pre- or post-trade processing, or excessive costs in accessing core components of the market infrastructure, can impose significant welfare costs. Under such circumstances, agents may be forced to deviate from their desired portfolio allocations and risk exposures, or indeed may be prevented from meeting their obligations as they fall due. With markets for credit risk transfer (CRT) growing rapidly, there has been an expansion in the range of transactions for which robust, resilient and well-designed infrastructure is essential.

Market failures in infrastructure provision and single points of failure

18 It is instructive to consider why providers of the market infrastructure and their members might, left to their own devices, invest too little in resilience and risk-mitigation. The answer lies in the microeconomics of infrastructure provision, and, in particular, the presence of market characteristics such as *network externalities*, *increasing returns to scale* and *coordination failures*.

19 By *network externality*, I refer to the incremental benefit derived by existing owners of a particular good or service when another party purchases that good or service. For instance, the broader the participation in a particular exchange or trading facility, the more extensive the trading opportunities and the deeper the liquidity; as a result, the greater the potential benefits from membership of that exchange. Equally, in the case of post-trade infrastructure – clearing and settlement systems – the greater the volume of transactions cleared or settled, the greater the potential for netting exposures and/or cash-flows (or in gross payment and settlement systems, the more efficiently liquidity can be recycled).

20 *Increasing returns to scale* reflect the fact that infrastructure provision is, by and large, a fixed-cost business: once an investment has been made in the information technology supporting the trade, clearing or settlement of a given volume of

transactions, the marginal cost of each transaction up to the capacity of the system is very low.

21 But the market characteristics imply a tendency towards natural monopoly in the provision of infrastructural services and hence dependence on a single, non-substitutable provider: often termed a ‘single point of failure.’ A monopolist provider of infrastructure services may face insufficient incentive to innovate – including in risk-reduction – and, importantly, may not fully internalise the potential effects of a disruption to its services on the financial system as a whole, thereby undervaluing system resilience from a public policy perspective.

22 But couldn’t the users of the infrastructure ensure that the monopoly provider invested more heavily in risk mitigation? And with many infrastructures being user-owned cooperatives, would there not be a natural mechanism for this?

23 Perhaps – and indeed there is evidence of effective risk-mitigation among user-owned providers, for example the throughput guidelines on payment flows to lower liquidity risk in CHAPS, the UK high value RTGS payment system, was led by member initiative. But such risk mitigation may still not be enough to meet social welfare goals fully.

24 First, the effects of a disruption are likely to be felt beyond what may be a narrow group of direct users of the infrastructure. That is, the effects may be systemic; for instance, there may be an interruption to the flow of liquidity via dependent markets or systems, or among participants relying on the system indirectly, for example through a correspondent banking relationship.

25 Second, users may place insufficient value on systemic stability because material operational failures are low-probability events and difficult to anticipate. Their assessment horizon may also be shorter than the social optimum.

26 And, crucially, *coordination failures* may be a factor: users of a particular infrastructure, many of whom may compete in underlying markets, need to coordinate their actions if they are to influence decisions on the future strategy of the

infrastructure provider. Investment in the reduction of operational risk will be one such decision. Difficulties in organising effective bargaining among users may leave them unable to coordinate, particularly in the face of differences in their information, expectations or preferences. Potential welfare-increasing actions may, therefore, not be carried out.

27 These market failures may justify intervention by the public authorities: either via a continuous oversight or regulatory regime; via targeted intervention; or maybe even via public ownership, as is often the case in respect of large-value payment systems and sometimes with securities settlement systems. An alternative strategy when faced with a monopoly provider might be to promote (or even set up) alternative, competing suppliers, to improve market contestability while ensuring adequate interoperability and substitutability across systems. Of course, given the existence of network externalities and increasing returns to scale, the cost of this form of risk mitigation may well be higher than the cost of regulating a natural monopoly on an ongoing basis.

28 Most typically, public intervention would seek to address the vulnerability stemming from single points of failure by the imposition of minimum standards of resilience on monopoly (or near-monopoly) systems, either to reduce the probability of operational failure; or to mitigate the impact of such failure by improving contingency arrangements – for instance, via increased investment in back-up facilities. Steps might also be taken to improve general risk management practices and mitigate the risk of exit of a key infrastructure; financial resilience and business risk is an important consideration here.

29 A regulator or overseer might also (or alternatively) seek to narrow the gap between the choices of a monopoly provider and the social optimum by encouraging more effective and inclusive governance arrangements. User- as opposed to external-ownership might be promoted, though, as previously noted, this might not be enough. Other measures might include steps to clarify the scope of the system's activities, admissions criteria, voting rights, transparency, and the role of external stakeholders.

30 For instance, in the UK, overall governance of payment systems is carried out via the newly-formed Payments Council. This body is headed by a governing board comprising a (non-voting) independent Chair, four independent directors, and eleven directors from the payments sector. The board is expected to consult with key stakeholders before determining strategy, and before making important decisions. Transparency is also enhanced via the publication of an annual report, with a separate contribution by the independent directors, and the publication of board minutes.

31 Finally, we should not underestimate the importance of users themselves building resilience within their own operations to single points of failure in infrastructures. For the very same reasons that monopoly infrastructure providers may tend to under-invest in resilience from a public policy perspective, even where run as user-owned cooperatives, financial institutions might also need supervisory encouragement to invest in work-around measures to deal with disruptions at the level of the core infrastructure.

Other sources of systemic risk

32 The existence of single points of failure is not the only manifestation of systemic risk in infrastructures, as the behaviour of agents within the systems can lead to problems spilling over to other participants given the interconnections and strategic interactions. For example, if a large net provider of liquidity to a real-time gross settlement payment system were to face severe operational difficulties which left it unable to make payments, other banks within the system might find themselves short of liquidity, and, *in extremis*, some might be unable to meet their own payment obligations. Behavioural responses, such as payment delays and liquidity-hoarding, might then exacerbate the problem within the payment system, potentially also spilling over to activity in other systems and financial markets. And, where a system is integral to the implementation of monetary policy, a disruption could directly affect a central bank's ability to set overnight rates and maintain confidence in the currency.

33 Although this variant of systemic risk does not originate directly in infrastructures, system design can, nonetheless, help mitigate the impact. Features of the design and operation of an infrastructure can help to lower risks of this type – for example, by

introducing collateralisation and loss-sharing rules, net sender limits and throughput guidelines to promote efficient liquidity recycling – so that failures do not give rise to financial contagion. Again, left to their own devices, users will lack an incentive to take into account fully the costs imposed outside of the system and they again face a coordination challenge in effectively implementing system design or rule changes to reduce such effects.

Infrastructure robustness and the changing nature of risks

34 Some of the financial market trends identified earlier have placed additional pressure on potential shortcomings in the financial infrastructure, attracting the interest of the public authorities and, in some cases, prompting targeted intervention. I would like to discuss two of these: financial market innovation; and the global linkages and system interdependencies that arise from the emergence of large cross-border banking groups.

Financial market innovation

35 Taking the first of these, over-the-counter (OTC) derivatives markets have grown rapidly in recent years, particularly in the credit sector, driven in part by the shift towards an ‘originate and distribute’ model of banking finance and by greater recourse to credit risk transfer to manage and hedge risks, as well as increasing activity by insurance companies, hedge funds and institutional investors in this sector. The infrastructure for OTC derivatives has, however, lagged behind.

36 Notwithstanding the emergence of new automated vendor services in recent years, OTC derivatives trades continue to be cleared and settled on a predominantly bilateral basis. Hence, a party to such a transaction is dependent upon the ongoing credit-worthiness, liquidity and operational robustness of its counterparty over the life of the contract. A sound legal basis for the trade is, of course, also critical. Rising volumes (and values) and the development of new, and often more complex, products have placed a strain on existing arrangements, exposing capacity constraints in existing procedures. Questions have also been raised over the risk implications of deficiencies in post-trade processes, most notably in the assignment of credit derivatives contracts.

37 Progress towards addressing these deficiencies was initially relatively slow, held back by coordination failures in the dealer community, until the regulatory community took an interest in 2005. The issue was noted in the Bank of England *Financial Stability Review* and the UK's Financial Services Authority helped to bring the issue to public attention. The Federal Reserve Bank of New York (FRBNY) later convened a group of 14 dealers and their regulators, encouraging them to set targets for the reduction of processing backlogs in credit derivatives and to put in place mechanisms for speedier post-trade processing going forward. The dealers were encouraged to embrace existing automated services for the delivery and matching of confirmations, and the industry was propelled rapidly towards the adoption of a Protocol for communicating trade assignments. The group was also encouraged to work with vendors, notably the Depository Trust and Clearing Corporation (DTCC), to implement solutions providing a framework for ongoing processing efficiency and data integrity. The result was the launch, in November 2006, of DTCC's Trade Information Warehouse.

38 In parallel, the Basel Committee on Payment and Settlement Systems has been investigating developments in the OTC derivatives space more generally, updating work carried out in 1998 to map the landscape and identify risk issues. The Committee published a report in March 2007.

39 The report recognises that the clearing and settlement infrastructure has been strengthened significantly in recent years, noting, in particular, the progress in automating and centralising key post-trade functions. But the report also highlights that there is more to be done. For instance, while processing backlogs in credit derivatives have been reduced substantially, they remain sizeable in other product lines. Recognising that the group convened by the FRBNY has been effective in resolving co-ordination problems, the report argues that momentum from the credit initiative should be carried across to other products. An initiative is already under way in this regard, with the FRBNY group having been expanded to 17 firms and a broader range of products. Firms are working towards targets for backlog reduction. Automation is a key element of this initiative, although it is recognised that there

needs to be interoperability between core vendor services if the benefits are to be realised.

40 One implication is that further public intervention might be required should coordination problems undermine the incentives to deliver such interoperability. And, as the OTC derivatives market becomes more dependent upon centralised providers of post-trade services, public authorities will need to consider whether established international standards for operational reliability of infrastructures should be applied to emerging new systems.

Global linkages and system interdependencies

41 The rapid growth of capital market integration and of large cross-border banking groups (often termed large complex financial institutions or LCFIs) and the increased international linkage between infrastructure providers also has significant implications for the assessment and reduction of systemic risk arising in or from the financial infrastructure. Specifically in an Anglo-Swiss context, for instance, we have seen Switzerland's SWX Group establish in London back in 2001 the recognised investment exchange, virt-x, as a cross-border trading platform, which offers central counterparty (CCP) clearing with both LCH.Clearnet Ltd and SIS x-clear AG, and settlement through CrestCo Ltd, Euroclear Bank and SIS SegaInterSettle AG. The Swiss CCP, x-clear, also plans to join LCH.Clearnet Ltd in clearing the London Stock Exchange.

42 Infrastructure providers have responded positively to the demands of an increasingly internationally oriented customer base by offering settlement links – which facilitate cross-border collateral and liquidity management – and clearing links – which allow margin offset with respect to positions held in related assets in different centres.

43 Cross-border mergers between infrastructures are also becoming more common. For example, in recent years, the UK's central counterparty for derivatives, London Clearing House (LCH) Limited merged with Clearnet SA, while the Euroclear Group acquired CREST, the securities settlement system for the UK and Ireland. The

Euroclear Group currently provides domestic securities settlement services in 5 European countries as well as international settlement services. Such tie-ups are of course an international extension of the microeconomics of infrastructure provision outlined above, exploiting economies of scale and network externalities. But, at the same time, they introduce common business risks and cross-border dependence on core systems, thus providing another channel for problems to spill across borders. Such cross-border linkages consequently add a layer of complexity to supervisory arrangements, making international coordination among the public authorities essential.

44 Linkages arising at the user level are again important here. As banks operate in multiple markets, there is increasing scope for shocks to propagate across borders. That may arise from the increased centralisation of banks' liquidity risk management. To the extent that banks use the foreign exchange markets to recycle surplus liquidity in one system to meet a shortfall in another, or else take advantage of settlement links between securities settlement systems to transfer collateral across borders, liquidity risk may be reduced. But, to the extent that banks respond to the availability of mechanisms for reallocating liquidity between systems by reducing their aggregate holdings, a bank may be more vulnerable to simultaneous liquidity demands across markets or to operational disruption to such mechanisms.

45 The Basel Committee for Payment and Settlement Systems has again been looking closely at issues arising from international integration of banks and infrastructures. In recent years, the Committee has published a report exploring mechanisms for the cross-border use of collateral, and in the context of a broader report on central bank oversight of payment and settlement systems, has established a set of principles for international cooperative oversight. Work is also continuing to map more formally the nature of international interdependencies between systems, and thus of cross-border risks.

Legal certainty

46 No matter how safe and resilient the market infrastructure, a sound legal basis for transactions is essential if the financial markets are to fulfil their role in effectively allocating scarce capital.

47 Financial markets operate within legal systems that not only regulate the behaviour of participants for the good of the markets as a whole, but also safeguard the property and contractual rights of those participants. Prospective market participants will have greater confidence to invest or to seek finance if they feel confident, first, that the regulatory obligations and sanctions imposed upon them are predictable and, second, that the contractual rights/obligations which they acquire/undertake can be identified with certainty.

48 Furthermore, market discipline is likely to be enhanced if participants' legal/contractual rights and obligations are precisely defined; the introduction of an ambiguity into the law can unsettle financial markets or exacerbate existing instabilities. Legal/contractual uncertainty is therefore a potential source of systemic risk. Two aspects of legal certainty are particularly crucial:

Contractual certainty

49 One key element of a stable legal framework is contractual certainty. Systems of contract law that show respect for formal agreements help to drive down commercial risk and therefore to promote the efficient allocation of capital. And uncertainty as to the enforceability of contracts is likely to be particularly damaging to financial markets. Against this background, contracts are becoming longer and more complex as financial innovation continues apace: the documentation for a structured finance product can often run into several hundred pages, thus raising the important issue of 'documentation' risk.

Legal and regulatory stability

50 Another key element is legal and regulatory stability. This is very important to the financial markets, where the ability to form complex plans with a degree of

confidence as to the stability over time of external influences (such as legal rules) impacts directly on risk, price and, ultimately, the efficient allocation of capital. A stable planning environment is conducive to investment and, therefore, market growth. Examples of harmful consequences of ambiguities in legal/regulatory frameworks include uncertainty as to the extent and scope of regulatory obligations or sanctions, and uncertainty as to how old laws will apply to dynamic and fast-changing market practices.

The Financial Markets Law Committee (FMLC)

51 In recognition of this, a number of countries have established groups of experts to promote greater legal certainty in financial markets. In the UK, the Financial Markets Law Committee was established in 2002. Its objective was to identify issues of legal uncertainty which might give rise to material risks, and to consider how such issues might best be addressed. The Committee seeks to meet this objective, first, via liaison with industry and market participants to identify those areas of legal uncertainty with potentially adverse impacts, and, second, by working with market experts to propose solutions.

52 One area in which the FMLC has been active in recent years is in encouraging the development of a smoothly functioning legal framework for cross-border transfers of intermediated securities. In 2005, the Committee undertook a thorough analysis of the advantages and disadvantages of harmonisation of the private international law in this area, as reflected in the Hague Convention. It was, and still is, widely accepted that such harmonisation would contribute to legal certainty by facilitating a clear identification of the law governing the holding and transfer of indirectly-held securities. This is particularly important in the context of the cross-border use of collateral: a key element of banks' global liquidity management strategies. Early in 2006, the FMLC published a paper that undertook a full analysis of the Convention and expressed strong support for its central propositions.

53 The FMLC's work in this (and other) areas has been well received and has contributed to the decision-making process for government at the national and supra-

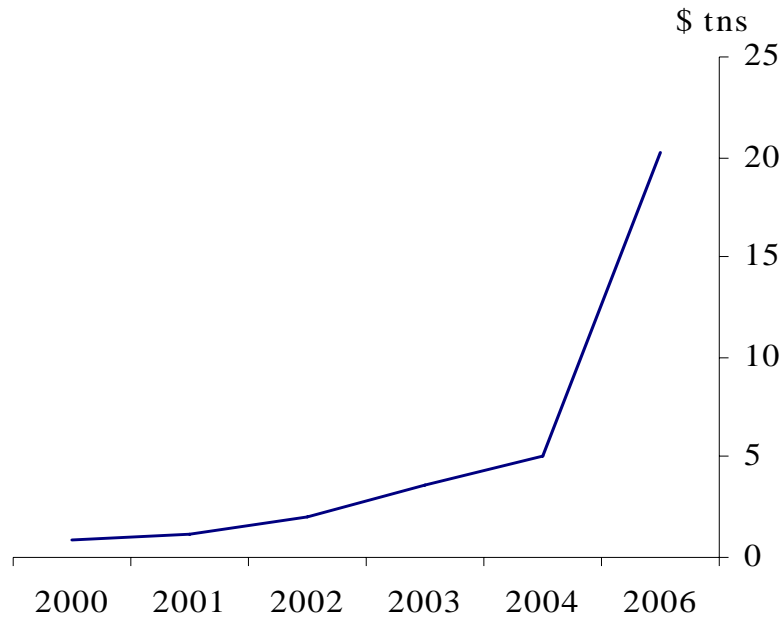
national level. Indeed, overall, the Committee has had some notable successes in addressing and ameliorating legal uncertainty in the financial markets context.

Concluding remarks

54 To conclude, the rapid structural change in global financial markets is providing considerable benefits to users of financial services, by lowering the costs of financial intermediation and improving the ability to manage and hedge financial risks and tailor financial products. But recent developments also provide new challenges and sources of vulnerability as financial markets become increasingly integrated, and as participants place increased reliance on sustained market liquidity to manage their risks. While financial institutions are in a strong financial position, risk taking has increased and the vulnerability of the financial system as a whole to a sharp change in conditions has risen. Against this background, and given the considerable uncertainty regarding how many new complex financial products would perform in more strained market conditions, it is important to improve the analysis and understanding of tail risks through systemic stress tests and thereby strengthen risk management, to ensure that financial institutions retain strong buffers of capital and liquidity, and that investment in the financial and legal infrastructure keeps pace with market developments and thus ensures that it remains robust and resilient.

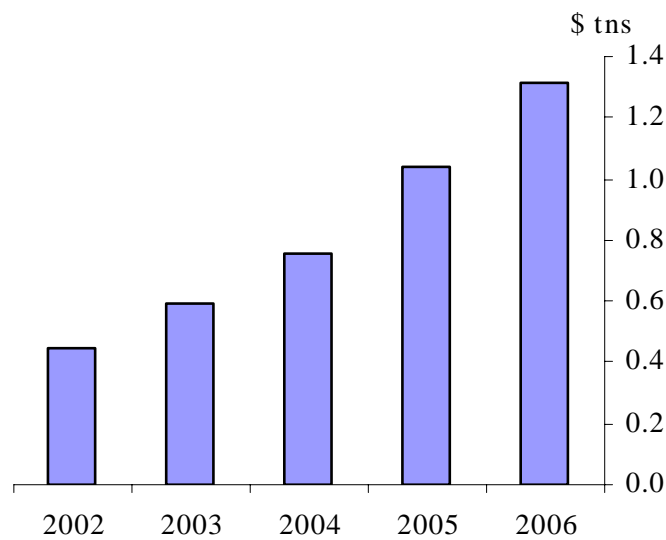
ANNEX

**Chart 1: Global Credit Derivatives Market
(notional amounts outstanding)**



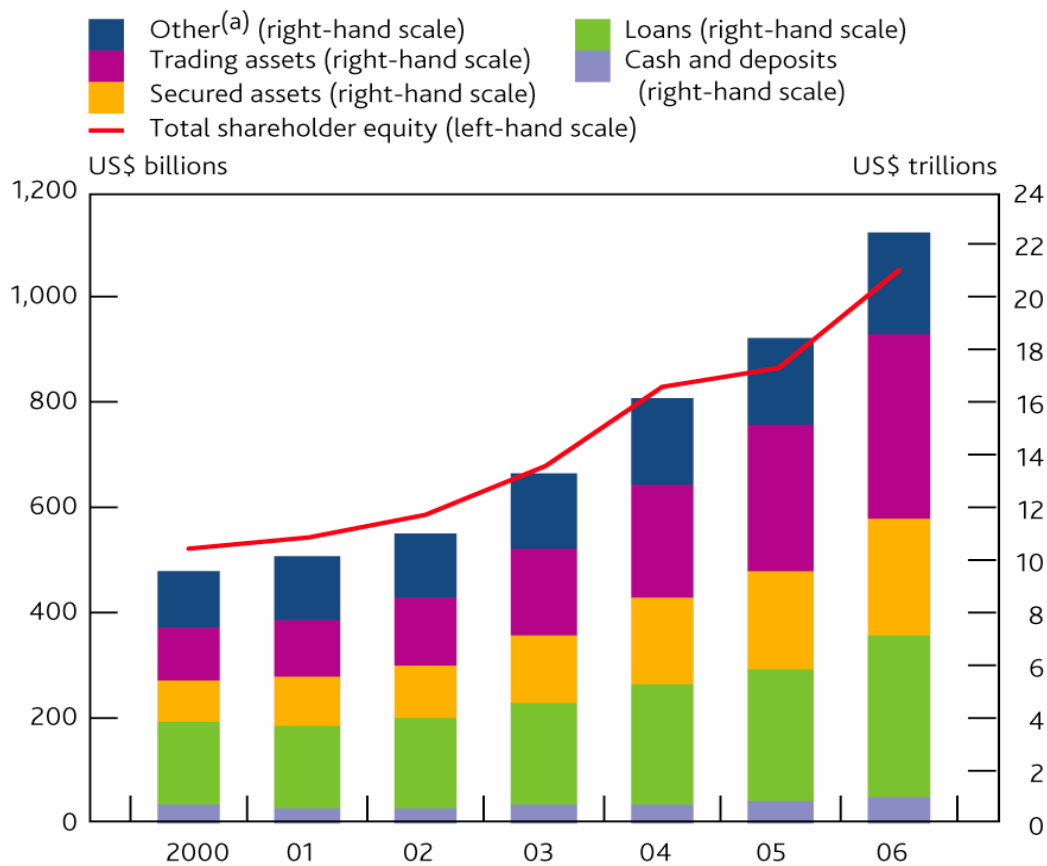
Source: BBA

Chart 2: Global leveraged lending issuance



Source: Dealogic

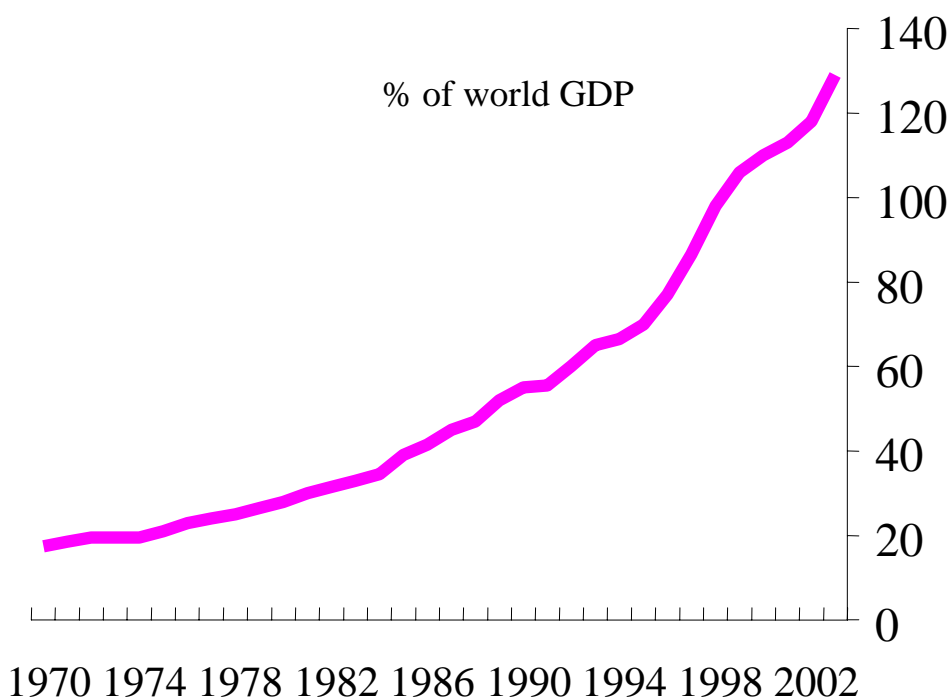
Chart 3: LCFIs' total assets



Sources: Bloomberg, SEC filings, published accounts and Bank calculations.

(a) Other includes (among other items) receivables, investments, goodwill and property.

Chart 4: Global external asset holdings



Source: Lane and Milesi-Ferretti (2005).