

LEVERAGE, MATURITY TRANSFORMATION AND FINANCIAL STABILITY: CHALLENGES BEYOND BASEL III

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Between 2007 and 2009 the global financial system suffered a huge crisis, with major harmful macroeconomic effects. In response, a major programme of regulatory reform has been launched and is part complete.

- Last year we agreed a major reform of bank capital and liquidity standards – Basel III.
- This year the Financial Stability Board will decide measures to address problems created by systemically important financial institutions (SIFIs) – by banks seen in the past as ‘too big to fail’.

These changes will make a major difference.

But the world’s regulatory authorities – central banks and bank supervisors – thought that they had it right when they agreed Basel II, and that was clearly wrong. So have we now got it right? Are we being radical enough? And do we understand the root causes of this financial crisis? This lecture asks those questions. It is organised in five sections (Slide 1).

- In the first three, I will argue that neither Basel III nor fixing ‘too big to fail’ through improved resolvability are sufficient to ensure financial stability, proposing that:
 - in an ideal world, we would set equity ratios significantly above Basel III standards;
 - the ability to resolve large systemically important banks is highly desirable, but not sufficient to address risks of systemic instability; and
 - that we need to address potential risks in shadow banking, avoiding too exclusive focus on individual banks or even on the whole banking system.
- In the fourth section I will suggest that underlying these findings are two fundamental issues, two key drivers of financial risk.

- The balance between debt and equity contracts across the economy and within the financial system.
- And the aggregate extent of maturity transformation which the financial system performs.
- In the fifth and final section, I will then suggest four policy implications.
 - The need for an equity capital surcharge for systemically important banks.
 - The vital importance of macro-prudential oversight focused on the aggregate levels and dynamics of leverage and maturity transformation.
 - The need for policy responses which are discretionary and varied through the cycle, rather than believing that there is any fixed set of rules sufficient in itself to ensure stability.
 - And the need to ask questions about the economic functions which finance performs, recognising that decisions on the appropriate robustness of stability oriented policies cannot be divorced from judgements about the social value of increased financial intensity, market liquidity and financial innovation, judgments largely avoided before the crisis.

Underlying these specific implications is, however, a more general one; that we are deluding ourselves if we think that there is any one policy – one silver bullet – which will permanently ensure a more stable system. The pre-crisis delusion was that the financial system, subject to the then defined rules, had an inherent tendency towards efficient and stable risk dispersion. The temptation post-crisis is to imagine that if we can only discover and correct the crucial imperfections – the bad incentives and structures – that a permanent, more stable financial system can then be achieved. It cannot, because financial instability is driven by human myopia and imperfect rationality as well as by poor incentives, and because any financial system will mutate to create new risks in the face of any finite and permanent set of rules. We can make the financial system more stable, but it will require a multi-faceted and continually evolving regulatory response.

1. Ideal capital ratios above Basel III levels

To think clearly about required policy we must be clear about the essential problem. The bank solvency and liquidity crisis of Autumn 2008 led public authorities to provide taxpayer support to prevent bank failures: government equity injections, government guarantees of senior term debt, and exceptional central bank liquidity support. Public debate therefore often focuses on avoiding any taxpayer support in future.

But, in fact, the total direct cost of such support is typically small compared with the macroeconomic harm wrought by financial crises.

- The International Monetary Fund's (IMF) estimates of the total direct cost of public support in the latest crisis, published in June last year, suggest that on average it might be less than 3% of GDP (Slide 2). Latest estimates for the US suggest it could be lower still, indeed negative, with public authorities making a profit, certainly in relation to the commercial banks, if not in relation to Fannie Mae, Freddie Mac and AIG. That's because equity stakes are often subsequently sold at a profit, debt guarantees often generate fee income but no losses, and central bank liquidity operations are often profitable.
- But these direct support costs are swamped by the macroeconomic harm produced by the financial crisis. US public debt to GDP will increase at least 50% in this recession, even if the direct cost of support ends up as zero. UK public debt will increase at least 50% of GDP, even though the direct costs may not exceed 5%.

That illustrates the need to focus on the drivers and costs of aggregate instability, and not solely on the causes and costs of individual institution failure. And the core problem we face is instability in the supply and demand for credit – first too exuberantly supplied in the upswing, then suddenly curtailed in crisis, inducing a credit crunch which becomes a self-reinforcing recession. (Slide 3)

Credit cycles are subject to inherent self-reinforcing dynamics (Slide 4) with easy credit driving asset price increases, which confirm in the minds of both lenders and borrowers the wisdom of yet further credit extension, until the cycle breaks and moves into harmful reverse. Financial stability reform will be effective if it reduces the severity of these cycles.

The core global response has been the Basel III rules on capital and liquidity. On the capital side, we have increased the required ratio of equity capital to risk weighted assets (RWAs) from 2% to effectively 7% – quite an increase. (Slide 5) And we have been more radical than even those figures suggests, because we have tightened the definition of equity and increased some risk weights, particularly for bank trading activities. We have changed the numerator, ratio and denominator; and the combined effect is large.

But in an ideal world free from transitional concerns, optimal equity capital ratios would be much higher still.

The case for believing that has been made by, among others, David Miles (2010) of the Bank of England Monetary Policy Committee (MPC), and by Martin Hellwig et al (2010). (Slide 6) Crucial to their arguments are the need to distinguish between social and private costs, to focus on small probability but potentially very harmful events, and to focus on the total system rather than on specific institutions.

Those three considerations together suggest that the costs of higher bank equity requirements are lower and the economic benefits considerably higher than many participants in this debate – from the banking industry but also from public authorities – have in the past assumed.

On the cost side, the insights of the Modigliani and Miller theorem (1958) are vital. If we increase the equity banks are required to hold there must, in the long run, be some offsetting decrease in the return which investors demand on a now lower risk investment. David Miles finds empirical evidence of this effect over the period 1992 to 2010: as bank leverage increased, bank equity betas – and thus the cost of equity – increased also. And several large banks have already cut return on equity targets, signalling to investors that in future investment in bank equity should be seen as both lower risk and lower return than in the pre-crisis period.¹

And while at the private level this lower pre-tax cost of equity is offset by the fact that returns on equity capital are not tax-deductible, while returns on debt are, that tax treatment creates a private cost of higher equity capital but not a social cost.² That simple point is too often ignored. It is indeed striking that public debates on optimum equity ratios have, even among some public authorities, been shot through with a profound confusion between the quite distinct considerations of private cost and social optimality. There is no general social interest in ‘economising in the use of equity capital’ (i.e. having higher leverage), but that was an aim overtly discussed in the design of the Basel II regime.

In assessing the benefits of higher equity ratios, meanwhile, three insights are essential.

- The first is the importance of low probability extreme events: David Miles argues persuasively that the adverse costs of even very rare banking crises are so great as to outweigh any marginal growth penalty resulting from higher equity ratios.
- The second is that the losses which the banking system may face are not simply exogenous shocks, but deeply endogenous to the system itself, and dependent on the subtle interplay of confidence and contagion. If confidence is lost, the system will suffer liquidity crunches resulting in a reduced credit supply which in itself creates credit losses.³ That is why bank stress testing is an art, not a science. In late Autumn 2008 and early 2009 there were many calls for the banks ‘to come clean about their losses’, and for regulators to discover and reveal them. But the losses were not external givens about which any bank management could ‘come clean’ or which any regulator could ‘discover’. If confidence could be restored rapidly and credit supply maintained, losses would be limited; if fear of losses destroyed confidence, severe losses would result from a credit and liquidity crunch. Stress tests are devices to ensure bank capital high enough that the macroeconomic conditions imagined do not actually arise. If they do not err on the side of

¹ Credit Suisse has, for instance, cut its return on equity target from 18% to 15%, and HSBC has cut its from 15-19% to 12-15%.

² If the tax-take from higher equity capital increases, governments will as a result receive larger tax revenues which they could, if they wished, use to offset any adverse effects arising from the higher cost of private credit intermediation. Whether or not such adverse effects actually exist is, however, itself highly contentious and depends on issues relating to the functions which credit performs within the economy. (See Adair Turner, *What do banks do, what should they do?*, lecture at Cass Business School, March 2010).

³ It is, for instance, notable that several countries where confidence in the banking system was lost or came under challenge during the financial crisis, have already chosen to introduce capital standards which go beyond Basel III standards. These include Switzerland, Spain and Ireland.

what looks *post-facto* like excessive caution, they fail to achieve their objectives.⁴

- Third, an undercapitalised banking system can impose a macro-volatility penalty even if no bank failures ever occur. If banks are so lightly capitalised that in the face of losses they constrain lending sharply, that can itself induce harmful macro-volatility, even if no bank becomes insolvent. Private sector arguments that Basel III capital requirements are too high because they are in excess of reasonable estimates of the losses which a bank might face, simply miss the point. What matters is the macro-systemic stability of credit supply, not just the risk of individual failure.

These theoretical arguments are, I believe, compelling. They suggest that if global regulators were benevolent dictators designing regulations for a banking system in a greenfield market economy, they would be wise to choose capital ratios far above even Basel III levels, something more like the 15% to 20% of risk-weighted assets which David Miles illustrates in his recent paper. And the empirical evidence is as compelling as the theoretical. Before the last 40 years or so, banking systems ran with much higher equity capital ratios, (Slide 7) much lower leverage, and yet economic growth was as high as today and investment as a percent of GDP as high if not higher. We do not need to run banking systems with anything like as high leverage as in recent decades. And today's regulators are the inheritors of a half-century long policy error, in which we have allowed private sector banks to pursue their private interest in maximising bank leverage, at times influenced by a deep intellectual confusion between private cost and social optimality.⁵

In an ideal world where we could choose to 'not start from here' much higher equity ratios would be optimal. But we are 'starting from here'. And while much higher equity ratios would not in the long run carry an economic penalty, the transition from sub-optimally high leverage could, unless managed carefully, slow recovery from the crisis induced recession.⁶ The analysis by the BIS Macroeconomic Assessment

⁴ Several commentators have, for instance, noted that the stress test conducted by the Committee of European Banking Supervisors (CEBS) in summer 2010 produced estimates of potential Irish bank losses far below those contemplated at the time of the IMF/EU rescue package in November. This does not illustrate however that there was a failure to 'come clean' but rather failure to apply stress test and recapitalisation rules sufficiently extreme as to lead to a restoration of confidence. A recent research paper for Société Générale by Vladimir Pillonca (*Ireland: Deleveraging the Housing Market and the Risks of a Severe Credit Crunch*, 3 March 2011) includes perceptive commentary on the essentially macro and endogenous nature of effective stress testing.

⁵ This private benefit derives both from the tax-deductibility of debt, and from the put option of limited liability.

⁶ There are two key ways in which the transitional economical consequences could be different from those which would apply in an ideal, comparative statics, analysis.

- The first relates to the cost of equity. The theory of Modigliani and Miller, supported by David Miles' empirical analysis, suggests that as equity ratios are increased the cost of equity will fall. The private sector argues, however, that if banks are forced over a short time period to raise additional equity, the cost will increase, given an upward sloping supply curve for new bank equity capital. Both assertions could be correct: one over the long term, the other over the short term. The appropriate policy response is a transition path to higher capital requirements which enables most banks to meet them out of retained profit.
- The second relates to levels of leverage in the real economy. There is a reasonable case that, in some countries and sectors, real economy leverage had become sub-optimally high in

Group (MAG) of the transition dynamics was therefore an essential input to the decisions of the Basel Committee and Financial Stability Board in the design of Basel III. And Basel III is best understood as a very valuable step towards greater financial stability in a world where today's policymakers must operate within the context they inherit. Optimal policy, like economic structure, is to a degree path-dependent.

But it is important to recognise that ideal equity ratios would be higher than Basel III, and that the system will therefore remain more vulnerable to instability than is ideal. Other aspects of policy are therefore vital – in particular policies for systemically important financial institutions (SIFIs as they have become known), i.e, with the set of banks which in Autumn 2008 were treated as 'too big to fail'.

2. Fixing 'too big to fail': making banks resolvable - necessary but not sufficient

The principle is that all banks should be able to 'fail'. But a wider definition of that objective is that our largest banks should be so regulated as to ensure that their failure or near failure produces **neither** the need for public direct support **nor** a harmful disruption to their own or to the wider system's credit extension capability.

To achieve that objective, it is essential that private fund providers to banks (whether equity or debt) can absorb losses without this triggering either the fire sale losses which can accompany standard insolvency procedures, or knock-on effects among fund providers which could in turn lead to reduced credit supply.

These conditions were not met before the crisis. In Autumn 2008, faced with the potential failure of several large banks, we were not confident we could impose losses on senior debt holders or even subordinated debt holders, without that producing large macro-disruptive effects, and we therefore supported those large banks via capital injections, imposing dilution losses on existing equity holders, but no losses on any other category of fund providers.

To avoid that dilemma in future, two ways forward are possible. (Slide 8)

- One is to require SIFIs to have 'higher loss absorbency', either more equity capital or more debt capital, with clear mechanisms specified for converting that debt capital to equity if needed to absorb losses and to maintain adequate equity capitalisation on a going concern basis.
- The other is to create 'resolvability' through mechanisms which enable the authorities to impose losses on all debt providers, through either write down

the pre-crisis period, with credit intermediation costs sub-optimally low. In these cases, an increase in the cost of credit intermediation and a reduction in the credit supply could in the long run be positive. Even in such circumstances, however, the process of deleveraging from a sub-optimally high level can create deflationary economic effects (for the original and classic description of these see Irving Fisher, *The debt deflating theory of great depression*, *Econometrica*, 1933).

or conversion to equity, so that the bank can be recapitalised and maintain its operations without disruption and without public support.

Both policy options should be pursued: they are complements, not alternatives. Both remove the need for taxpayer support and reintroduce *ex-ante* market discipline. Indeed, at a conceptual level they are not wholly distinct but different ways of achieving smooth loss absorbency.

That is clear if we consider the potential role for 'bail-inable' debt (Slide 9), senior debt which can be written down or converted to equity at the point when the bank would otherwise fail, with convertibility achieved either via contractual provisions or through statutory requirements. Such bail-inable debt can be seen either as a reserve army of potential capital, or as a tool for resolving firms without the complexities and disruptions which might arise if losses were imposed on hundreds of thousands of depositors, rather than on hundreds of senior debt securities. Either way, it could be very valuable.

But it can never be as certain a way to improve financial stability as more equity, for reasons which take us back to the centrality of macro-systemic concerns.

Much of the debate about contractually bail-inable debt and resolvability focuses on the legal mechanisms: do we have the legal processes to resolve banks? Do we know enough about internal management and legal structures and inter-dependencies to make rapid resolution possible? And can we overcome the complexities of multiple legal systems, property right conventions and insolvency regimes which would at present make smooth resolution of a large cross-border bank extremely difficult?

But assume for now that we can fix these problems. Would we have fixed the problem of 'too big to fail'?

- Clearly yes, if we are talking about the idiosyncratic failure of a large bank – a failure like Continental Illinois in 1984, or Barings in 1995, unrelated to a wider collapse in asset values and confidence. And that in itself would be valuable, helpfully re-introducing *ex-ante* market discipline.
- But large systemically important banks are most likely to fail amid general systemic stress, when many other banks, big or small, are also under stress, and when the failure of one might radically increase the stress faced by others. Answers to the SIFI problem must adequately address this more likely scenario. And in such conditions, bail-inable bonds would only enable us to avoid the dilemma of Autumn 2008 if regulators could be confident that those bonds are held outside the banking system by investors who could face the imposed losses without that inducing systemic effects.

And it may be very difficult to be confident that those conditions are met.

There are two ways to gain that confidence: neither may be entirely feasible.

- The first would be for regulators to understand, or to regulate, which investors hold bank medium-term debt. Today a significant proportion is probably

initially held by other banks, and a larger proportion still by a broadly defined group of 'fund managers'. (Slide 10). But ownership after secondary market trading could be significantly different. And some of these 'fund managers' may be in turn financed by banks (e.g. hedge funds by prime brokers), or linked to the banking system by complex repo and derivative relationship. And our ability to track these complex inter-connections, and as a result to predict the knock-on consequences of initial losses in conditions of systemic fragility, is imperfect today and likely to remain so. We need to improve our understanding of financial system interconnectedness, but it may never be good enough for us confidently to impose large losses simultaneously on the senior debt of multiple large banks (or indeed multiple small banks), in conditions of macro-systemic stress.

- The second approach would be based on faith in market and investor rationality, assuming axiomatically that investors who buy bail-inable bonds will only do so on rational assessments of their ability to absorb risks in all possible future contingencies. This axiomatic assumption was central to the pre-crisis conventional wisdom, the reason why public authorities thought they could sleep easy in the face of an explosive growth in financial scale, complexity and interconnectedness. But it relies on an assumption of fully informed rationality, which may be simply untrue and indeed impossible. For as Andrei Shleifer et al (2010) have argued in a perceptive recent paper, it may be inherent to human nature that in the good times investors fail to take rational account of the tail of low probability adverse events.

A bail-inable bond will have a highly skewed probability distribution of pay-outs. (Slide 11) Over long periods, only the zero-loss segment of the distribution may be observed. A low probability of significant loss continues to exist, but Gennaioli, Shleifer and Vishny argue that that low probability will be wholly discounted through a behavioural process which they label 'local thinking' – the reality, deeply rooted in human nature, that not all contingencies are represented in decision makers' thought processes. After a period of good times, investors will assume that senior bank debt is effectively risk-free; that indeed is what they did in the years before the crisis: bank CDS spreads falling to historically low levels in Spring 2007, just ahead of the worst banking crisis for 80 years, and the market price of default risk providing no warning whatsoever of impending disaster. (Slide 12). Regulators cannot therefore rely on free-market discipline to ensure that the debt is only held by investors who can suffer loss without that causing knock-on systemic disruption.

If therefore we can neither perfectly and continuously monitor or regulate who owns bail-inable debt, **nor** rely on free-market discipline to ensure that it is always appropriately held, contractually bail-inable debt and technical resolvability will be valuable but still imperfect solutions to the 'too big to fail' problem. We can only be sure that losses can be smoothly absorbed if we are sure that the investors who provide funds do not suffer from 'local thinking' but remain perpetually aware of the full distribution of possible results. Subordinated debt which can convert to equity well before potential failure ('early trigger CoCos') may approach what is required since the price will presumably vary with probabilistic expectations of future conversion. But only with pure equity can we be fully confident that the dangers of 'local thinking' will not creep in over time, and that investors, facing day-by-day price

movements up and down, will remain continually aware that they hold a potentially loss absorbing instrument.

While therefore the debate about 'too big to fail' banks often assumes that we will only have been truly radical when we resolve a major bank with losses imposed on debt holders, the ideal solution remains one in which there is enough equity or close to equity capital to reduce to a minutely low level the probability of us ever having to impose losses on the debt holders of large banks.

So in an ideal world we would increase equity requirements for all banks well above Basel III levels. And to make large systemically important banks safer in a world where overall equity standards are suboptimal, resolvability and/or bail-inable debt are valuable tools, but more equity (or close to equity instruments such as early trigger CoCos) is the best solution.

We need to allow for non-rational decision making, for myopia, as well as fix bad incentives. And we need to keep our focus on systemic stability and macroeconomic consequences, not just on whether we can avoid taxpayer costs and smoothly resolve specific institutions. That focus implies that equity ratios are of central importance.

3. Markets as important as institutions: shadow banking as important_as banks

But also that we must not focus exclusively on specific institutions, such as banks, but on total financial systems and markets. Since the crisis, global regulators have focused primarily on capital and liquidity regimes for banks, both in general (Basel III) and for big banks in particular (the SIFI agenda). But in the initial year of the crisis, 2007 to 2008, it did not seem like a familiar banking crisis, but something entirely new, a crisis of 'shadow banking'.

Among the key events were: (Slide 13)

- In June 2007, liquidity pressures at two hedge funds sponsored by Bear Stearns Asset Management leading to the imposition of gates on investor redemptions, sudden increases in margin calls, and sudden drops in asset prices.
- In August, major losses at hedge funds which the market had thought were following low-risk market-neutral strategies, as a result of knock-on consequences from margin calls in structured credit portfolios.
- The closure in February 2008 of hedge funds Carlyle Capital and Peloton in the face of additional collateral calls on mortgage backed securities.
- Gradually growing problems throughout 2007 to 2008 in the liquidity and solvency position of off-balance sheets structured investment vehicles (SIVs) and conduits which had taken leveraged positions in structured credit products, and had funded those with liabilities far shorter than the contractual

maturity of the assets, many of these liabilities (ABCP) bought in turn by money market mutual funds.

- The rescue of Bear Stearns in March 2008 and the failure of Lehman Brothers in September, the latter the key trigger for the dramatic intensification of the crisis. Both of them broker dealers/investment banks rather than commercial banks.
- The emergence in Summer 2008 of major stresses among money market mutual funds, which had previously seemed to promise investors an attractive combination of enhanced return, immediate fund access, and capital certainty, with Reserve Primary Fund 'breaking the buck' on 16 September 2008.
- The development between August to October 2008, of a new form of liquidity run: a run as much in the secured lending markets (such as repo) as in unsecured funding.
- And, throughout late Autumn 2008, significant deleveraging by hedge funds, whose sales of credit securities into a falling market helped drive a downward spiral of trading book asset values, which in turn undermined confidence in the solvency of major banks.

This seemed at the time a new form of financial crisis, different from the classic bank failures and bank runs of the past. And it occurred within a financial system which in the 20 years before the crisis had seen dramatic growth in a complex system of non-bank credit intermediation (Slide 14).⁷

This entailed:

- Money Market Mutual Funds (MMMFs) growing at the expense of bank deposits;
- credit increasingly extended via the purchase of credit securities rather than through traditional bank loans;
- an explosive growth in complexity, with derivatives and securities tranching giving us the alphabet soup of CDS and CDO and CDO squared; and
- with the most rapidly growing institutions being not traditional commercial banks, but broker dealers, i.e, the investment banks.

Given this history, it might seem odd that so much focus over the last two years has been on the capital and liquidity of commercial banks. In fact, that focus can be justified: banks, as leveraged, maturity transforming and credit providing institutions, play a central role in the system, and it was when the crisis spread from 'shadow banking' to the core banking system in Autumn 2008 that it threatened major

⁷ While this growth was most evident in the US, with bank credit intermediation remaining more dominant in other countries, the banking systems of other countries were deeply interconnected with the US shadow banking system, whether via trading operations based in the US, as purchasers of credit securities, as counterparties in derivative and repo markets, and because US shadow banking institutions such as money market funds were (and still are) key providers of short-term funding.

macroeconomic harm. But we certainly need to understand the nature and consequences of these shadow bank developments, and identify the fundamental drivers which could in future lead to the re-emergence of 'shadow banking' risks in new forms.

Shadow banking can be understood as a turbo charged variant of non-bank credit intermediation. (Slide 15) Credit can flow from ultimate fund providers (households or corporates) to ultimate users (households, corporates or governance) through the banking system, or through non-banking routes. Both routes have existed as long as modern capitalism. An individual can buy a corporate or government bond, directly or via an insurance company or pension fund, as well as deposit money at a bank which in turn lends it on. But securitisation and shadow banking dramatically changed the scale of such non-bank credit intermediation, and changed its nature and riskiness in two crucial ways. (Slide 16)

- It introduced leverage and maturity transformation, the classic functions of banks, into the non-bank intermediation channel, with MMMFs performing large scale maturity transformation, with hedge funds employing leverage, and with SIVs both leveraged and maturity transforming.
- And (Slide 17) while it was in part a parallel system of credit, it was also deeply entwined with the classic banking system – with MMMFs providing funds into the banking system and with the banking system via repo and other secured finance markets providing funds to SIVs, conduits, hedge funds and other investors.

But it is important to understand not just what occurred but why. And two recent papers argue persuasively that among the most fundamental drivers was investor demand for very low-risk debt instruments; a demand, however, which exceeded the quantity of truly low-risk instruments which could objectively exist.

Thus:

- Gorton and Metrick's analysis (2010) focuses on the dramatic development of the repo market from 1990 to 2010, with huge increases in total values transacted, but also a huge widening of the classes of collateral used in repo transactions. They see these markets as essentially deriving from a demand for 'money equivalent' assets – immediately liquid, and of certain or close to certain capital value, but delivering attractive returns above those available on pure risk-free T bills.
- Gennaioli, Shleifer and Vishny's analysis meanwhile, illustrates how the 'tranching' of credit securities met investor demands for an apparently low or zero risk debt instrument (the AAA tranches of structured credit products) delivering attractive yield uplift versus pure risk-free Treasury bonds.
- And the same investor demands and perceptions lay behind the growth of the MMMFs – funds which appeared to provide the liquidity and capital certainty of bank deposits, but were delivering a higher return.

These developments were, however, fundamentally unstable, because they were based on assumptions about available combinations of risk and return which at the macro-systemic level were objectively impossible. Beyond the financial system there exists a real economy with corporates, households and governments whose cash flows available to service debt are subject to a combination of both modelable risk and inherent irreducible uncertainty. The financial system can divide, repackage, and distribute those risks, but only to a limited extent, by pooling, can it reduce them. But the complexity of a large financial system, combined with 'local thinking', can result in assessments of risks which are in aggregate impossible given the objective reality of the non-financial real economy. The financial system can perform some useful 'financial engineering', but when it attempts financial alchemy, it will produce only fools' gold.

Subject to 'local thinking', investors in the good times assume that objectively risky instruments are close to risk free, but then rapidly and in a herd revise their estimates of riskiness when the first evidence of defaults emerges, bringing back into their consciousness, as it were, the previously ignored downward tail of the distribution.

Such a description of investor decision making clearly breaks with the assumptions of rational expectations which have dominated economics for the last several decades. Its implications for appropriate regulatory reform are profound, as Gennaioli, Shleifer and Vishny themselves highlight. It means that many credit securities **'owe their very existence to neglected risk'**, and thus that the total amount of credit extended to the real economy could be larger than optimal. It implies that **'it is not just leverage but the scale of new claims itself, which might require regulatory attention'**, and that **'recent policy proposals, while desirable in terms of their intent to limit leverage and fire sales, do not go far enough'**.

Risks in the financial system thus derive not only from incentives faced by individuals or institutions which might encourage them to act in socially harmful ways (e.g. by increasing leverage above socially optimal levels) but also from inherently imperfect investor evaluations of risk. And that in turn implies that:

- aggregate levels of debt and leverage in the real economy, and trends in those levels, are key determinants of financial stability;
- risks can exist in interconnected markets as much as in specific institutions; and
- that those risks could exist even if we were able to resolve all banks, or even indeed if we broke up large banks into smaller ones. A system of multiple interconnected players could be as risky as one with some large institutions.

4. The fundamental issues: aggregate leverage and maturity transformation

Section 1 argued that in an ideal world equity requirements would be significantly higher than Basel III. Section 2 argued that making all banks ‘resolvable’ is necessary but not sufficient to ensure financial stability. Section 3 identified the need to focus on all forms of credit intermediation which entail leverage and maturity transformation, as well as on risks in the formal banking system.

All three Sections illustrate the importance of focusing on the drivers of systemic instability rather than the causes of idiosyncratic failure. And all three suggest that underlying the consideration of specific policy options there are two fundamental issues.

- **Optimal leverage:** the optimal balance between debt and equity instruments within both the real economy and the financial system itself.
- **Optimal maturity transformation:** the optimal extent to which the financial system in aggregate enables the non-financial real economy to hold short term assets but long-term liabilities.

Overall debt/equity balance

A short essay by Luigi Einaudi, the eminent mid 20th Century Italian economist and Governor of the Bank of Italy, entitled simply ‘Debts’ (*Debiti*)⁸, starts by making a simple but fundamental point. It is possible to imagine a hypothetical economy in which there were no debt instruments nor indeed fixed wage contracts, but instead all capital investments and all labour contracts took the form of defined participations in the fluctuating value added of real economic enterprises. If such an economy existed, argues Einaudi, it would be free of the instability which can plague actual market economies. But neither savers nor employees are willing to accept the fluctuating uncertainty of totally flexible contracts – they seek the apparent certainty of defined interest debt contracts and of defined wage employment contracts.

Debt contracts are thus naturally arising consequences of a demand for a degree of certainty. And because that demand reflects deeply rooted human preferences, the existence of debt contracts is both directly welfare beneficial and conducive to economic growth, since some savers who would not make equity investment commitments may be willing to do so in a debt form. The creation of debt instruments thus has economic benefits.

But debt contracts introduce into the economy rigidities, vulnerabilities and irreversibilities which can result in financial instability. Five important factors make debt contracts quite different from equity contracts.

- **The rigidities of bankruptcy proceedings**, which because of administration costs, business disruption and fire sale losses, impose non-linear and irreversible losses. As Ben Bernanke has observed, ‘in a complete markets

⁸ Luigi Einaudi, ‘Debts’, Selected Economic Essays, Macmillan 2006. First published as *Debiti, La Riforma Societe XLI*, January 1934.

world, bankruptcy would never be observed: this is because complete state contingent loan agreements would uniquely define each party's obligations in all possible circumstances'.⁹ In such a world, debt claims would convert smoothly to equity claims without disruptive costs. Techniques such as special resolution regimes and contractually bail-inable debt are, in essence, devices to avoid the rigidities and losses of classic insolvency procedures, taking us closer to the smooth adjustments of a complete markets world. But these devices can never be perfect.

- **The potential for fire sales**, downward spirals of selling inducing falling prices which in turn induce selling – and not only at the point of bankruptcy, but in an attempt to avoid bankruptcy or to minimise losses. Such a spiral we saw in Autumn 2008, leading to huge trading book losses and rapid erosion of capital bases.
- **The fact that debt contracts last for finite periods**, and must therefore be continually rolled over to maintain the total stock of debt extended to the real economy. Equity investments are permanent: the money does not need to be repaid if confidence in economic prospects falls. As a result, an economy could be relatively unharmed by a complete 'sudden stop' of new equity investment, i.e., no new equity issues for a significant time. A sudden stop of the new credit flow, by contrast, leads to a sudden reversal of trade, investment, and growth, as we saw in late Autumn 2008.
- **The existence of multiple and potentially fragile equilibria**, with credit spreads determined by assessments of risks, but with assessments of risks for highly indebted firms, households or sovereigns strongly influenced by the interest rate that the borrower pays. If the market believes a heavily indebted sovereign is insolvent, that very belief, expressed via the interest rate on new debt, can make the sovereign insolvent.
- Finally, **the power of the credit and asset price cycle** (illustrated on Slide 4), the ability of credit extension to drive asset price increases and further credit extension in a self-reinforcing fashion.

These distinct characteristics of debt contracts explain why irrational exuberance in banking systems and credit markets is far more harmful than in other markets such as equities. A wealth of empirical evidence – from Charles Kindleberger (1978), Robert Shiller (2000) and many others – illustrates the potential for all financial markets and systems to be susceptible to self-reinforcing herd and momentum effects.¹⁰ And a rich set of economic theories explains why these effects are bound to occur. But they can occur in equity markets without producing severe macroeconomic harm. The internet boom of 1995 to 2000 (Slide 18) was undoubtedly a bubble followed by a bust, and some misallocation of real resources to wasteful investment projects certainly resulted. But the adverse macroeconomic impact was slight: some equity investors gained, some lost, but there were limited

⁹ Ben Bernanke, *Essays on the Great Depression*, Chapter 2 *Non-monetary effects of the financial crisis*, Princeton University Press (2004).

¹⁰ Charles Kindleberger, *Manias, Panics and Crashes*, (1978). Robert Shiller, *Irrational Exuberance*, (2000).

knock-on consequences from the losses incurred. In contrast, irrational exuberance in debt markets and banking systems, and its subsequent puncturing, can drive severe macroeconomic volatility and harm.

Aggregate leverage both within the real economy and within the financial system itself and its change over time are therefore crucial determinants of financial stability. And the insights of Shleifer, Gennaioli and Vishny, and of Gorton and Metric imply that we cannot rely on rational choice within free markets to select the socially optimal level. Myopia means that people, corporations, or states may accumulate debt liabilities, and investors accumulate debt assets to an extent which makes the system highly vulnerable to a sudden shift in risk assessments.

- In sovereign debt markets both borrowers and lenders suffer from unstable myopia. Borrowers – the citizens on whose behalf the State borrows – suffer from an unstable awareness of Ricardian equivalence effects, ignoring for long periods their rising indirect liabilities but then suddenly becoming aware of them when debt crises arise and governments increase taxes and reduce expenditures, in turn cutting their own expenditures in anticipation of future taxation burdens. Lenders to sovereigns, meanwhile suffer from local thinking – assuming until 2008 for instance, (Slide 19) that Greece was almost as creditworthy as Germany, before rapidly adjusting their assessments.
- In private debt markets, meanwhile borrowers' assessments of debt sustainability are heavily biased by the asset price increases which increased credit supply itself produces. Lenders are subject to local thinking, creating the conditions for credit surges and sudden stops. With an added but very important impetus deriving from the fact that corporate tax regimes, and in some countries personal tax regimes, create strong tax incentives towards debt rather than equity financing.

A key function of what financial regulation is therefore simply to lean against the pervasive tendency of financial institutions, companies, households and indeed sovereigns, to select levels of leverage which are socially sub-optimal.

Looking forward, therefore, we need to treat the aggregate level of debt and equity, and its change over time as a key variable to be monitored and managed.

But we need also to focus on aggregate maturity transformation.

Maturity transformation is a key function of the financial system, enabling non-financial agents – corporates and households – to hold longer-term financial liabilities than assets. The transformation is achieved either: (Slide 20)

- via the intermediation of a financial sector balance sheet (most typically a bank's) whose assets are of longer contractual maturity than its liabilities; or
- via a liquid traded market, in which a contractual long-term liability can be treated by investors as a short-term asset, because it is sellable in a liquid market.

These two ways can then in turn be combined and interconnected – as they were within the shadow banking system with significant maturity transformation achieved via a complex combination of transforming balance sheets (such as those SIVs and conduits) and markets (such as those for securitised credit).

And the maturity transformation achieved is undoubtedly socially valuable. By enabling the non-financial sector to hold longer-term financial liabilities than assets, it is both directly welfare enhancing (because it enables households to smooth consumption over time) and potentially conducive to longer term investment. But it introduces major financial stability risks.

- When performed via bank balance sheets, it creates the risks of liquidity runs – since not all depositors can simultaneously get their money back at the contractually due date.
- And when performed via liquid markets, it creates the risk of self-reinforcing downward spirals of falling prices and collapsing liquidity, if investors who collectively account for a large percentage of the market simultaneously seek to sell their contractually long-term commitments.

As with leverage, so with maturity transformation, there is therefore a social optimality trade off between the welfare and investment benefits and the financial stability vulnerabilities created. And as with leverage, so with maturity transformation, we cannot assume that free financial markets will produce a socially optimal balance, since myopic ‘local thinking’ investors will not always allow for the possibility that markets which are liquid in the upswing could rapidly become illiquid in a financial crisis.

Monitoring aggregate maturity transformation performed by the financial system is therefore vital. But also incredibly difficult. If the financial system took the form of one bank or of multiple banks acting in a largely independent fashion with minimal interconnectedness, it would be fairly straightforward to see the amount of maturity transformation being performed. But once the financial system is a complex web of banks and other financial institutions – linked via repo and interbank markets, and interconnected with a system of market based maturity transformation – our ability to understand how much maturity transformation the total system is performing, and how that level that is changing, is seriously impaired.

In the decades before the crisis that impaired ability almost certainly prevented us from spotting a very major and very risky increase in aggregate maturity transformation.

From the mesh of financial system claims and interconnections it is difficult to see this picture. But if we focus instead on the non-financial system:

- We know that households (Slide 21) accumulated far greater liabilities as a percent of GDP, partly matched by increased deposits, and we know that the liabilities were primarily mortgage debt with 20-25 year contractual terms, the deposits instant access or relatively short term.

- We also know that there was a huge expansion of contractually long-term credit securities, but that only a small proportion of those ended up in the balance sheets of long term hold-to-maturity investors such as pension funds or insurance companies. Instead the majority of UK residential mortgage-backed securities (RMBS) in particular were held by investing institutions, such as SIVs and mutual funds, behind which stood – at the end of the chain – short-term investors.
- And we know that corporates in many countries have become increasingly cash rich, but that they typically place their money in short-term instruments, corporates accounting for instance, for an increasing percentage of money market deposits. (Slide 22)
- Finally, data suggests that the tenor of financial institutions' unsecured debt issuance shortened steadily during the 1990s (Slide 23).

It is therefore likely that one of the root causes of the crisis was that the aggregate maturity transformation performed by the financial system grew significantly in the pre-crisis years but that, fatally, we failed to spot this.

That failure arose both because:

- we did not have in place the data gathering and analytical tools which would have enabled us to spot it; and
- because we were over influenced by an efficient market theory which suggested that we could rely on the free market naturally to gravitate to a socially optimal balance.

In future, we need to do better. But also, I suggest, to address three key questions.

- First, what is the optimal level of maturity transformation in the economy? Is the financial system currently doing 'too much'? Should our liquidity policies be aiming explicitly to reduce the extent: or should we be aiming via better liquidity insurance policies – whether private or social (i.e., via central banks) – to perform the existing level of maturity transformation more safely? This is a fundamental issue, but not one to which academic economists, central bankers or regulators so have any clear answers.
- Second, do we understand all the factors which are influencing financial system maturity transformation, including the role of non-bank channels, such as insurance companies and pension funds.¹¹ As mentioned earlier, a surprisingly small proportion of UK RMBS was held by pension funds and insurance companies which might seem the natural holders of long-term credit securities. A more stable securitised credit system might require a larger role for such investors. But that larger role would require households to make larger long-term savings commitments through pension funds and/or insurance companies. Aggregate maturity transformation performed by the

¹¹ A research note by Standard & Poor's Equity Research, *European Insurers*, 18 January 2011, Section 3, Insurers' Role has a useful discussion of this issue.

banking and shadow banking system will therefore be a function of policies relating to long-term savings incentives, as well as of policies specifically related to bank liquidity.

- And third, is there a potential trade-off between higher leverage and higher maturity transformation, and if so should our prudential regulations reflect it? Global regulators have been in the business of global bank capital regimes for 25 years now, since Basel I was first introduced. We are just starting to apply global quantitative liquidity rules – the Liquidity Coverage Ratio and Net Stable Funding ratio which will be introduced by Basel III. But perhaps in the long term, we should be more overtly linking and trading-off capital versus liquidity regimes. Which is riskier? (Slide 24), a very highly capitalised bank which is performing very large maturity transformation: or a lightly capitalised bank, but subject to much tighter liquidity controls? It is not a question we have in the past overtly addressed: arguably we should.

5. Four policy implications

So there are important unanswered questions. We need indeed to recognise how complex the financial system is and how imperfectly we understand it. In December 1930 as the Great Depression deepened, Keynes remarked ‘We have involved ourselves in a colossal muddle, having blundered in the control of a delicate machine, the workings of which we do not understand’¹². He was talking about the operation of the international monetary system: but the same could be said of the international financial system. We understand its interconnections and dynamics imperfectly. And one of our pre-crisis delusions was that we didn’t need to understand its detailed plumbing better because we could assume that it **naturally** tended to a socially optimal equilibrium.

But beyond that general point, what implications follow for public policy? Let me suggest four:

- still higher capital standards, in particular for systemically important firms;
- macro-prudential oversight of a continually mutating system;
- policy responses which are discretionary and varied through the cycle; and
- the fact that appropriately robust policies for financial stability must reflect an assessment of the economic value added of increased financial intensity and innovation.

Higher equity ratios for systemically important firms

In an ideal world we would impose higher equity requirements than Basel III. In the absence of that ideal, we need to reduce the probability and impact of SIFI failures. The best way to do that is with equity surcharges.

¹² Keynes, *The Great Slump of 1930*, first published December 1930. *Essays in Persuasion*, Norton (1963)

Other policies should also be pursued.

- Making all banks, however large, smoothly resolvable is a key objective.
- And for large complex cross-border trading banks that may require regulating the internal structure of those banks, more clearly separating different businesses or geographies. This issue is being considered by the Independent Banking Commission (IBC), and they should certainly not be constrained by any assumption that the present complex structures of banks always deliver vital social benefits – too often indeed, they reflect the objectives of tax avoidance and regulatory arbitrage.
- As for the actual break up of large banks, there are pros and cons, which the IBC is also considering carefully. It would not be a panacea, since instability risks could also arise from the complex interconnectedness of many small banks, but it should certainly not be excluded from consideration.

But whatever other measures are pursued, higher capital requirements remain central, because only they directly address the vital issues of macro systemic instability. And some countries may choose to progress to higher capital standards than Basel III for all of their banks. Ireland is imposing a minimum 10½% Core Tier 1 (CT1) requirement (and 12% target) to restore confidence in its banking system. Spain is moving to 8%, in order to ensure that confidence is not lost. Switzerland has imposed higher requirements on its two major banks to ensure that the confidence loss of Autumn 2008 is never repeated. Sweden has announced a target ratio of 10% – 12% CT1 to lock in permanently a position of strength.

For the UK, with major banks which are very large relative to our GDP, a key policy objective for this year is to ensure that Financial Stability Board (FSB) decisions on SIFIs result in higher than Basel III equity requirements for our most systemically important banks.

Macro-prudential oversight of a continually mutating system

Whatever the equity requirements or resolution mechanisms in place, however, they will not permanently assure financial stability. For the very fact of imposing stricter regulations will induce changes which create new risks, requiring new regulatory responses. In 1980 what we then called ‘broker dealers’ were not systemically important; by 2008 they had mutated into hugely systemically important investment banks. AIG was an insurance company which developed a large investment bank business. Shadow banking could grow again precisely because we are improving our regulation of banks. The economist Paul Romer, at a conference last week at the IMF, suggested the rule that ‘Every decade or so, any finite system of financial regulation will lead to systemic financial crisis’, simply because risks will migrate to avoid whatever the static rules in place. The periodicity could be debated; but the reality of perpetual financial system mutation and regulatory arbitrage is clear. One of the intellectual delusions of the pre-crisis Great Moderation was to believe that there existed a single set of rules which could permanently achieve both monetary and financial stability.

Continual macro-prudential oversight of the financial system is therefore vital, and a crucial function of both the UK's new Financial Policy Committee, and the European Systemic Risk Board. That oversight should focus in particular on aggregate levels of leverage, and on aggregate maturity transformation. And it should identify whether financial activities are shifting to new institutions and markets. If in response to Basel III credit extension moves to new shadow bank markets and firms, for instance to hedge funds, and if within those markets and firms we seek bank-like risks – leverage and maturity transformation – we need to spot that and if necessary extend the reach of regulation. Alongside our work on SIFI issues, the Financial Stability Board is therefore developing recommendations on how regulators should monitor and if necessary regulate shadow bank activities.

Discretionary through-the-cycle responses

Macro-prudential policy cannot however be limited to the extension or reform of rules which still remain static on a through-the-cycle basis. It needs also to include levers which can vary across the cycle.

The dynamics of debt creation described on slide 4 are strongly self-reinforcing and it is unlikely that any feasible level of bank capital could fully offset them. And these dynamics can arise as much in markets for securitised credit as well as via bank credit. In response, macro-prudential regulators – in the UK the Financial Policy Committee – need to be able to use countercyclical levers to lean against credit and asset price cycles.

- These levers will certainly include the imposition of countercyclical capital requirements on banks – and the Basel III regime explicitly allows for this on a globally consistent basis.
- But if the dangers of self-reinforcing credit and liquidity cycles exist within shadow-banking markets as well as within banks, then the same principle of countercyclical capital may need to be applied in those markets. In Section 3 I highlighted the centrality of the repo market to the development of shadow banking, and the fact that in September to October 2008 we faced a new form of liquidity run – a run in secured financing markets such as repo. Repo and other secured finance contracts require posting of margins – collateral in excess of the funds advance. That margin is essentially contract specific (equity). Left to itself, and suffering from myopic risk assessment and local thinking, market competition drives those margins to very low levels in good years, and increases them dramatically at the first sign of trouble provoking harmful pro-cyclical effects (Slide 25).¹³

We therefore need to consider whether regulation should set minimum levels of margin, in good years as well as bad. Or indeed whether we should increase margin requirements as booms develop, leaning against the cycle. This is among the policy options which the FSB shadow banking project will consider.

¹³ See CGFS Papers, No. 36, *The role of margin requirements and haircuts in procyclicality*, March 2010.

- Thirdly, however, we may need to consider macro-prudential limits on borrowers as well as on lenders. Loan to value or loan to income limits on residential mortgages may be controversial: such limits on commercial real estate may be difficult to impose without provoking complex avoidance. But their imposition in the boom years would directly address the core problem we face – the interconnected instability of credit and asset price circles. And if such measures could successfully reduce the probability or severity of credit cycle induced recessions, they would be in most borrowers' interest.

It may be many years before any of these policy tools need to be used: the economy today is certainly not suffering from an irrationally exuberant upswing. And the first task of the interim FPC will be to consider in detail the pros and cons and the practical implementation and complexities of the different possible policy tools.

But the principle that we must be open to the use of discretionary through the cycle tools is clear. We cannot rely on the assumption that any static set of policies – whether focused on capital ratios, or resolvability, or structural change – will produce a permanently stable system.

Financial intensity, innovation and stability

The implication of Shleifer's analysis is that financial instability is driven not just by faulty incentives but by forms of myopia. As a result fixing incentives – by making all banks resolvable and by reforming individual bonus structures – is necessary but not sufficient. The idea that overpaid bankers cynically took risks because they knew that someone else would pick up the bill is overstated: many pre-crisis bankers were as fooled as their customers by the irrational exuberance of the market.

But that does not mean there are no issues about the level of remuneration in financial services or about the social utility of increased financial intensity. Rather, that the issues are more fundamental than a focus on the costs of bank bail outs suggest.

The three decades running up to the crisis saw a remarkable explosion in the size of the financial system relative to the real economy (Slide 26). Financial sector balance sheets increased relative to GDP, and by much more than can be explained by increases in real economy leverage, with a huge growth in the complexity of intra-financial system claims. Financial innovation exploded, giving us the alphabet soup of securitisation and derivative markets, the 'technologies' of tranching and hedging. Trading volumes grew massively relative to real variables – FX trading growing 234 times between 1977 and 2010 while global GDP grew seven times; oil trading increasing from one times physical consumption to ten times. Financial sectors in total grew relative to GDP (Slide 27). And this increasing financial intensity was accompanied by big increases in financial sector pay relative to average earnings (Slide 28).¹⁴

¹⁴ See T Philippon and A Reshef, *Wages and Human Capital in the US Financial Industry 1909-2006*. NBFRR Working Paper No 14055

The pre-crisis conventional wisdom asserted that this increase in financial system interconnectedness, innovation, and remuneration, was socially valuable in two ways.

- Ensuring financial stability, since it enabled risk to be distributed into the hands of investors and other economic agents best placed to absorb and manage it.
- And fostering allocative efficiency, since it completed more markets and ensured more efficient price discovery.

The crisis clearly proved the first assertion completely wrong. But where has it left the second proposition, that financial intensity drives allocative efficiency?

That is a very wide and important question. I considered it in a recent lecture at Clare College in Cambridge,¹⁵ but do not have time to address it in any detail this evening. But let me finish with two points.

First, we cannot simply assume axiomatically that increasing financial intensity produces valuable allocative efficiency benefits, given a wealth of theory which suggests that it is possible for financial intensity to be rent extracting rather than value creative, and which suggests that any beneficial impact of increasing financial intensity in terms of allocative efficiency must be subject to declining marginal returns.

And second, that the answer to this question has implications for financial stability policy. Many of the measures we could take to increase stability – such as higher capital requirements against trading activities or against intra-financial system claims, both issues still on our agenda beyond Basel III – might well reduce the scale of trading activity and the liquidity of some markets. If these activities and related liquidity are value creative (at the social level) we may need to make a trade off between stability and allocative efficiency. If they are zero sum or rent extracting, there is no such trade off. The less certain we are that increased some financial activity delivers improved allocative efficiency, the more radical we can be in the pursuit of stability-oriented reforms.

¹⁵ Adair Turner, *Reforming Finance; Are we being radical enough?* 2011 Clare Distinguished Lecture in Economics and Public Policy – Section 2: Financial Intensity, Inequality and Social Value.

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