

## Chapter 2

# Macro-Prudential and Micro-Prudential Regulation

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This is not the first international banking crisis the world has seen. Some estimates put it as the eighty-fifth. If crises keep repeating themselves, it seems reasonable to argue that policymakers need to reconsider, and not just ‘double-up’ existing regulatory measures. It also means that policymakers should not superficially react to the characters and colours of the current crisis. The last eighty-four crises occurred without credit default swaps and special investment vehicles. The last eighty-odd had little to do with credit ratings.

The reason we try to prevent financial crises, as discussed in Chapter 1, is that the costs to society are invariably enormous and exceed the private cost to individual financial institutions. We regulate to internalise these externalities in the behaviour of such institutions. One of the main tools regulators use to do this is capital adequacy requirements.

The current approach to capital adequacy is micro-prudential. Micro-prudential regulation—consisting of such measures as the certification of those working in the financial sector; rules on what assets can be held by whom; how instruments are listed, traded, sold and reported; and measures of the value and riskiness of assets—concerns itself with the stability of

individual entities and the protection of clients of the institutions. Micro-prudential regulation examines the responses of an individual bank to exogenous risks. It does not incorporate endogenous risk, and it neglects the systemic implications of common behaviour.

### **Making the Macro Unsafe by Minding the Micro**

A traditional approach to micro-prudential regulation is to consider a matrix with the probability of a credit event like a default on one axis, from low to high, and the loss given the default or impairment on the other, from low to high. Regulators say to financial firms that they must analyse their assets using this matrix and get rid of those assets in the top right hand corner where there is a high probability of a large loss. This is faintly ridiculous. Any bank that is willingly holding assets that will deliver it a high likelihood of a large loss does not need regulation; it needs to lose its banking licence. The real problem is not that banks willingly hold assets that they know will deliver a large loss with a high probability and are simply waiting for the regulator to tell them they cannot, but that assets *become* ‘toxic’. However, when this occurs the regulatory matrix is unhelpful. It implies that the bank now has to sell the asset and indeed, where these rules

become standards, every regulated institution has to sell the same asset at the same time, causing its price to collapse towards zero and making banks short of capital (when compared with the higher risks and lower value of their assets). This in turn forces banks to sell other assets previously held for their low correlation with the original problem asset, causing asset correlations to rise, giving the impression that risk has risen further, and causing banks to sell more assets. This loss spiral was a feature of credit markets in 2007-08, of the dotcom debacle of 2000-01, of the Long Term Capital Management crisis of 1998, of the East Asian crisis of 1997-98, of the stock market crash of 1987 and of other modern financial crises. Paradoxically, micro-prudential rules can turn a bad situation into a worse one.

It causes us some concern therefore that in response to the crisis some argue that banks were not following micro-prudential rules strongly enough and so these rules must be deepened and made more comprehensive. The spread of micro-prudential rules can undermine systemic resilience. The best solution from a systemic perspective to the problem causing assets to turn 'toxic' is that the firms that have funded these assets with short-term liabilities should indeed mark them down, and other firms who have access to long-term liabilities should be able to consider whether the assets are now fair value at the marked-down price and whether they should buy. Instead, the spread of micro-prudential rules to non-banks like insurance firms (Solvency II) and funds (sometimes via brokerage arrangements with regulated banks) tend to lead to everyone being a seller at the same time.

Regulators must be careful about the application of micro-prudential rules, especially those on responding to market measures of value and risk, and ensure that they do not artificially create homogenous behaviour. We believe that macro-prudential regulation is where the glaring deficit in regulation lies.

Often, the problem is that in booms banks and borrowers underestimate risks and, when the crash comes, they overestimate risks. An essential problem is the big shift in risk perceptions, from 'too low' initially to 'too high'.

The purpose of macro-prudential regulation is to narrow this gap by forcing banks to assume they have more risks than they think they do in the boom – by putting aside more capital than they think they need – and to try and support lending in the crash by releasing this capital. The striking thing about this crisis given the commentary is that it was not caused by banks throwing hand grenades of 'toxic' assets into unsuspecting crowds and running as far away from them as possible; it was caused by banks throwing hand grenades of 'toxic' assets and then running *towards* them because they didn't think they were 'toxic'. In fact, they devised complex special purpose vehicles to get more exposure to them than their capital adequacy requirements would allow.

In contrast, a macro-prudential approach to regulation considers the systemic implications of the collective behaviour of financial firms. A critical feature of macro-prudence and systemic stability is the heterogeneity of the financial system. Homogenous behaviour – everyone selling at the same time or buying at the same time – undermines the system. Invariably, market participants start off being heterogeneous but as we have seen above, a number of factors – some regulatory, some not – drives them to homogeneity. In this regard systemic risk is endogenous and macro-prudential regulation is about identifying those endogenous processes that turn heterogeneity into homogeneity and make the financial system more fragile.

### Box 1: Alternatives for Implementing Counter-Cyclical Regulation

There is a growing consensus that the most important manifestation of market failure in banking and financial markets through the ages is pro-cyclicality. The credit mistake is made during the booms even though it only becomes apparent in the bust. A rapid increase in loan portfolios is positively associated with an increase in nonperforming loans later; loans made during booms have a higher probability of default than those made in periods of slow

credit growth. Also, collateral requirements are often relaxed in good times as collateral prices rise, and tightened in bad times. There is also growing agreement that both Basel II and the International Financial Reporting Standards mark-to-market system have an additional pro-cyclical impact on required capital by banks, reinforcing further the natural tendency of banks to lend pro-cyclically. Following the errors of prior regulation, counter-cyclicality has gained momentum as a regulatory principle. While such regulations need to be carefully structured and the devil lurks in the detail, they are fairly straightforward in design.

Counter-cyclical bank regulation can be introduced, either through banks' provisions and/or through their capital. It is important that this is done through simple rules, so regulators cannot relax them in boom times, when they can become captured by the over-enthusiasm that characterises booms (see elsewhere in this Chapter and Chapter 3 for a discussion of this effect).

Introducing counter-cyclical bank provisions has already been done for some time in Spain and Portugal, showing this is feasible and consistent with Basel rules. The Spanish dynamic provision system requires higher provisions when credit grows more than the historical average, linking provisioning to the credit cycle. Under this system, provisions built up during an upswing can be accumulated in a fund. The fund of what they called 'statistical provisions' but would now be considered 'macro-prudential provisions' can be drawn down in a slump to cover loan losses. This counters the financial cycle as it discourages (though does not eliminate) excessive lending in booms and strengthens the banks for bad times. Counter-cyclical rules regarding changes in the credit exposure of financial institutions would also be desirable. In particular, financial institutions could be asked to increase provisions when there is excessive growth of credit relative to a benchmark or a bias in lending toward sectors subject to strong cyclical swings (such as property mortgage

or credit card lending). Indeed, India adopted counter-cyclical provisioning requirements for lending in the housing market fairly similar to the Spanish approach in that they were calibrated to increase in periods of rapid credit growth.

An alternative approach for counter-cyclical bank regulation through provisions is via capital. Charles Goodhart and Avinash Persaud have presented a very specific proposal: increasing Basel II capital requirements by a ratio linked to recent growth of total banks' assets. This provides a clear and simple rule for introducing counter-cyclicality into regulation of banks and can be easily implemented. In this proposal, each bank would have a basic allowance for asset growth, linked to macro-economic variables, such as inflation and the long-run economic growth rate. Growth above the basic allowance over the past year would have a 50 percent weight; growth over the year before that would have a 25 percent weight and so forth until 100 percent is approximated. Regulatory capital adequacy requirements could be raised by 0.33 percent for each 1 percent growth in bank asset values above the basic allowance. For example, if bank assets grew at a rate of 21 percent above the growth allowance, minimum capital requirements would rise from 8 percent to 15 percent. Given that credit cycles tend to be national, the application of counter-cyclical regulations needs to be on a host country basis. This would serve the added benefit of ameliorating the feast and famine of cross-border capital flows which we discuss below.

The existing framework of banking regulation was insufficiently macro-prudential and had been recognised as such by commentators for some time. We are not against micro-prudential regulation per se and we believe supervisors have an important role to play in addressing consumer protection issues and protecting the tax payer from abuse of the implicit government insurance. Aside from the absence of macro-prudential regulation, we note that the zeitgeist of the boom time, 'government

bad, markets good', impacted the quality of micro-prudential regulation. Supervisors were insufficiently ambitious in their oversight of banks. Going forward, supervisors should start off by making sure they understand exactly how a bank earns its profits and if they understand that fully, they are likely to be more aware of the amount and type of risk a bank is taking to earn those profits. That said, we do believe that endogenous risks that undermine the financial system often relate to an ill-considered application of micro-prudential regulation.

### What to do about Credit Rating Agencies? Avinash Persaud

Back in the summer of 2007, the collapse of confidence in the credit ratings of the once \$1trn asset-backed commercial paper market triggered the global financial crisis. Investors lamented that they were lured into dodgy assets by credit ratings that were upwardly biased by the conflicted business model of the rating firms. The agencies became everyone's favourite punching bag; and policymakers are under pressure to do some punching too. To restore confidence in credit ratings there must be such adverse consequences for the agencies of poor ratings that it spurs innovation in credit research that in turn leads to more accurate ratings. Some hope that this will be achieved by switching the business model from ratings being paid by borrowers to investors. This seductively simple idea is flawed. In today's information-free, equal-disclosure world, the value of a rating is that everyone knows it. But if everybody already knows it they will not pay for it.



A common call has been for greater disclosure of ratings methodology. We have seen this before with disastrous results. Since 2004, U.S. rules requiring disclosure of rating methodologies helped banks arrange credit

structures so as to maximise their credit rating. But this destroyed the statistical independence that underpinned the ratings and made the breakdown of structured finance ratings inevitable. While the issuer-pays business model is common across all ratings, rating failures are concentrated on structured finance. According to Standard & Poor's, the likelihood that a structured finance product held on to a 'BBB' rating throughout 2008 was a desultory 58 percent. The likelihood that a single-issue borrower – where it is almost impossible to 'build to rating' – held on to a BBB rating last year, a year of recession, was an impressive 88 percent. This suggests that the problem was not so much the business model – common to both types of ratings – but it was 'build to rating' behaviour, only possible by methodology disclosures in structured credit products.

Governments should instead require that agencies follow standardised rating definitions so there can be better comparison between firms and no investor can claim to be rating-confused. However, improving the transparency of ratings may not deepen the consequences of rating-failure. Many investment rules require investors to use all three major rating firms, neutering market discipline. Governments can respond to this market structure problem by raising the agencies' fear of ratings failure.

Ideally, rating agencies should be taken out of bank regulation altogether, but we may not be able to put the genie back in the bottle given that ratings will still exist. The trick is to devise a system that does not incentivise firms to become overly conservative – developing countries and small companies already feel their ratings are too low. A symmetrical measure of ratings performance is a Gini-coefficient, which measures the ordering of defaults relative to the order of ratings. In 2006, the Gini-coefficient of defaults in instruments rated by Standard & Poors ratings was a near perfect 90 percent. In 2007 this remained high in sovereign and corporate credits,

but slumped to 73 percent in structured finance. The lower the Gini co-efficient, the higher the financial penalty a ratings firm might incur. The biggest rating agencies could be required to put 20 percent of their revenues into a common pot that would be redistributed to those with the highest Gini co-efficient. A results-based, not process-based intervention would create innovation-boosting consequences of rating failures, while keeping governments out of the ratings kitchen.

A critical part of micro-prudential regulation in the last decade was the increasing use of market prices in valuation and risk assessment. This was done in the name of transparency, risk-sensitivity and prudence, but what it achieved was increasing homogeneity of market behaviour and as a result increased systemic fragility. The avenues through which market prices shaped behaviour include mark-to-market valuation of assets; regulator-approved market-based measures of risk, such as the use of credit spreads in internal credit models or price volatility in market risk models; and the use of credit ratings, where the signals are slower moving but positively correlated with financial markets.

Where measured risk is based on market prices, or on variables correlated with market prices, it can create systemic risk as market participants herd into assets that were safe in the past but where the crowding of investors make the assets overvalued, risky, and increasingly correlated with other assets the herd of investors own. Consequently, market-price based measures of risk end up being highly pro-cyclical, falling in the build-up to booms and rising in the subsequent crashes. Micro-prudential behaviour can endogenously create macro-prudential risks.

In light of the observations above, we believe that capital requirements need to have a counter-market-price (counter-cyclical) element to them in order to dampen rather than amplify the financial and economic cycle by requiring buffers of resources to be built up in good times.

In the next Chapter we look at credit cycles in greater depth, especially their international component, and we consider the appropriate regulatory and institutional responses.

A second major source of homogeneity in the financial system relates to *funding* and *leverage*. If regulators make little distinction between how assets are funded, financial institutions will all rely on cheaper, short-term funding, which increases interconnectedness and systemic fragility. In a crisis where there is a rush for cash and funding dries up, all those market participants who had purchased assets using short-term funding are forced to sell assets at the same time. This is even more pronounced if the asset purchases were highly leveraged and the drying up of funding requires highly leveraged holders to try and sell before others do, so as to save what little capital they may have left. In Box 2 we look at how regulators could disincentivise funding mismatches.

A third major source of homogeneity in the financial system is the tendency of regulators and others to consider risk as one thing, to be treated the same way and measured as the volatility of short-term prices. But risk is not one thing alone, there are different types of risk: credit risk, liquidity risk and market risk. We know they are different because they would each be hedged differently. Credit risks are best hedged by finding uncorrelated or negatively correlated credits: the credit of oil companies with inventories of oil may be inversely related to the credit of airlines, as they are generally 'short' of oil. Liquidity risks are best hedged across time: the more time you have before you have to sell an asset, the more you can hold assets that are hard to sell quickly. Market risks, like the value of equity markets, are best hedged using a combination of time and diversification. A financial system will be safe if each of these risks is held by market participants with a capacity for that specific type of risk. A financial system would be unsafe, even if each institution held more capital, if risks were not held where there was appropriate capacity. Arguably the neglect of issues of funding and the over-emphasis on market prices did just that.

### Box 2: Regulation of Funding and Liquidity

Imagine two banks have the same assets. One funds those assets expensively, using deposits from their loyal deposit base and the other funds the assets cheaply by rolling over overnight borrowing every day. Previously, bank regulators did not make a distinction between these two banks. The markets did not distinguish between the two banks either and when they did they thought the short-term funded bank was more 'efficient' given that its funding was cheaper. Northern Rock, which funded 120 percent mortgages with short-term capital markets borrowing, had a higher stock market rating than HSBC which relied far more on deposits to fund assets. The prevailing view was that risk was inherent in the asset, not its funding; yet we can see today that these two banks are very different and that the risk of the asset reflects a combination of the liquidity of the asset and the liquidity of the funding. By not making this distinction, regulation incentivised banks to fund their assets using the cheapest funding which was invariably the shortest term. Regulators have woken up to this issue. Minimum funding liquidity is back on the table for discussions at the Basel Committee on Banking Supervision and at the Financial Stability Board. The U.K. amongst others has already announced that new liquidity requirements will require banks to hold much more capital or to lower their dependence on short-term money market funds. Below we set out one way in which capital could be used to disincentivise maturity mismatches.

In a financial crisis the liquidity of assets falls and the maturity of funding contracts. Consequently, putting aside capital for liquidity using current measures of the liquidity of assets and liabilities would be pro-cyclical. The implication is that for regulatory purposes the liquidity definition of assets could be fixed into two camps (liquid and illiquid) and the capital requirement could be time varying, encouraging maturity matching in a boom but relaxing this requirement in a crash.

The liquidity-based capital adequacy requirement could be multiplied by a factor that reflected the degree of maturity mismatch between pools of assets and pools of funding. Assets that the central bank does not normally consider suitable for posting for liquidity would be assumed to have a fixed 'liquidity maturity' of two years – implying it could take as much as two years to sell the asset. If a pool of these assets was funded by a pool of two-year term deposits, there would be no liquidity risk and no liquidity charge. But if the pool of funding had a maturity of one month and so had to be rolled over every month, the liquidity multiple on the base capital charge would be near its maximum – say two. Consequently if the capital adequacy requirement for credit risk was at 8 percent of risk-weighted assets, the new requirement for credit and liquidity risk would be 16 percent. The multiple would fall geometrically from 2 to 1 as the maturity of the funding lengthened. The maturity definition of assets and liabilities could be fixed for the purposes of this regulation in order to avoid the pro-cyclical appearance of maturity mismatches as assets become less liquid and funding dries up more quickly in the bust.

Banks with a capacity for credit risk sold the credit risks to others because of capital adequacy requirements on banks, and bought liquidity risk that they had no capacity for because they were allowed to rely upon short-term wholesale funding. Life insurance companies sold liquidity risk, for which they had a capacity, to banks because solvency ratios and mark-to-market accounting discouraged the holding of illiquid assets. At the same time, they bought credit risk, for which they had no particular capacity given that (a) they were not in the origination business with the ability to diversify credits and (b) they had long-term funding, and credit risk is the one risk that rises over time. In 2006, although banks each apparently had formally adequate capital under applicable regulations, and almost all were significantly above their minimum requirements, the system was highly fragile. In Chapter 7, we take a further look at this critical issue of risk allocation.



### Regulation of Instruments and Markets

The crisis and the dysfunction of over the counter wholesale markets in complex instruments have raised the issue as to whether complex instruments and OTC markets should face greater regulation. These appear to be micro-prudential issues, but they are also macro-prudential.

Complexity is often associated with other problems. Products may be complex to try and evade regulations or taxes or to ‘mis-sell’ to uninformed buyers. Evading regulation and taxes and mis-selling with complex or simple products is illegal in most jurisdictions; these laws should be tightened and enforced. Supervisors should be empowered to look at all instruments and markets and, if they believe that their use or growth raises systemic issues, to require tighter regulation. The contracts for instruments that are made complex solely to deceive consumers or the authorities should be unenforceable. This should incentivise sellers to ensure buyers understand the instruments they sell. Regulators should be able to block the enforcement of deceptive instruments before any buyers have any losses.

But the fault lines of regulation should remain with systemic risk or consumer protection. Complexity by itself is neither new nor bad. Indeed, risk is created by trying to match simple assets to complex liabilities. In some cases, individuals do not have access to assets and instruments of sufficient complexity. The simplest product a retail investor can buy today is an instrument that tracks the equity index. Management charges for these products are small and transparent. The instrument’s value is transparent and reported frequently. But this is a highly risky asset for many people, especially an elderly person, because the equity index does not offset their financial liabilities: the cost of their mortgage, pension, health care etc. Indeed, at times of general unemployment, the asset falls in value at precisely the time when a typical individual’s net liabilities rise. We could imagine a product that provided financial insurance for an elderly person against all the potential expenditures they may have in the future and rose in value when the individual’s liabilities rose. It would be a highly complex, illiquid, derivative instrument, but it would be low risk for the elderly buyer.

Complexity may be used to help people do bad things, but complexity itself may not be bad. Sometimes complex illiquid instruments are the heroes; we discuss some examples below. Similar issues arise with the notion that we should define ‘safe’ and ‘risky’ products to sanction the former and ban the latter. This is well-intentioned, but misguided.

Our primary focus should not be instruments. Instruments are fluid, easily created and abandoned. Most complex instruments are in fact packages of simpler instruments put together to make them cheaper than buying each separately. The fundamental problem with the deceptive notion of good and bad, safe or risky instruments is that risk is less a function of the instrument and more a function of behaviour. Declaring assets ‘risky’ or ‘safe’ will change behaviour in an adverse way. Complex, illiquid instruments can be used in a safe manner and simple, liquid instruments like mortgages can be used in an unsafe way. We need instead to regulate risky behaviour, in large part by restraining—through capital requirements or otherwise—the mismatch between risk taking and risk capacity; we discuss this in greater depth in Chapter 7 on risk allocation.

### Exchanges, Counterparties and Clearing

Exchanges are useful for concentrating buyers and sellers of ‘commodity’ instruments – instruments that are similar or identical. One ordinary share in General Motors is identical to another and so they can be traded on an exchange. The vast majority of financial assets however are not commodity instruments, but derivatives or bespoke or illiquid instruments.

Announcing to the world that you want to sell a bespoke illiquid instrument on an equity exchange will drive the price against you. If the market place knows this is your position, market players may drive the price lower in anticipation of your forced sale if the price falls far enough. This was a feature of the LTCM crisis. Consequently, those instruments where announcements to buy and sell have no impact on market prices – because the trades are small relative to the market – should be on an exchange and there should be pre and post-trade transparency; those instruments where

such an announcement will move the price away should be free to be traded through the negotiated, inter-dealer markets (OTC) as long as there is mandatory post-trade transparency to the authorities and less frequent and more aggregated reporting to the public. In terms of trading venues this is what happens today, reflecting the markets' revealed preference for trading where there is maximum liquidity for a particular type of trade. Our concerns therefore are less with the venue of trading and more with issues of reporting – especially to the regulator – and of processes that reduce settlement risks and uncertainty, such as netting and centralised clearing.

The gross positions of derivative traders are many times their net positions. A typical derivative trader might have a \$1bn position in options on the U.S. dollar, where it will be paid by a counter-party if the dollar rises above a certain level, and a \$0.75bn position where it has to pay a different counter-party if the dollar rises above this level. Central clearing of trades between the major counter-parties allows traders to forget about counter-party risk (because the clearing house takes over the position) and view this as a \$0.25bn net position and therefore allows the trader to put aside capital for its smaller net position than its much larger (\$1.75bn) gross position. The presence of the central clearing house further reduces the risk that a counter-party failure will freeze the market with uncertainty and rumours of the solvency of traders. With respect to central clearing, it is likely that 70 percent of OTC transactions will be seen by clearing houses to be clearable. (This will be maximised the more clearing houses are independent organisations not beholden to any particular trading venue.) But perceptions and measures of risk are 'pro-cyclical'. Consequently, it is likely that in the middle of a crisis, there will be instruments that clearing houses will consider to be more risky than before and refuse to clear, thereby closing the credit markets more tightly to new borrowing. Pressure on clearing houses to clear more instruments during the boom could also undermine the resilience of clearing houses just as we make them more central to the markets.

This is an argument for every instrument having a clearing plan 'B' if they are no longer

centrally cleared. This plan 'B' would probably specify bilateral collateral arrangements. Instruments that are cleared in accordance with plan 'B' would not incur an extra capital charge – as this would act pro-cyclically to worsen financial conditions in a crisis. It is unlikely that market participants would prefer bilateral trading where central clearing is on offer given the lower risks and collateral costs of central clearing. Instruments that are not centrally cleared and have no 'clearing plan B' built into the contract should incur a capital charge to reflect their contribution to systemic risks.

In the third quarter of 2008, Mexico hedged its \$35bn of oil revenues using an OTC derivative, paying \$1.5bn for a put on oil prices struck at \$70 per barrel. It is estimated that the puts have earned Mexico some \$8bn. This was a highly illiquid derivative contract and whatever the outcome of it was the safe thing for Mexico to do. It would have cost Mexico considerably more if they had to trade this contract on an exchange as it would have sent the price of puts up sharply and the oil price sharply lower as the markets reacted to the trade announcement. It would also not have been likely if 'speculators' were not allowed to be on the other side of the trade. Invariably when producers want to sell forward so do consumers and it takes a disinterested person in the middle with a view on oil prices to make such a hedge possible.

In summary, macro-prudential issues are very different from micro-prudential issues. They are about how interdependencies and endogeneities in the system lead individual firms to behave homogeneously. The use of market prices in valuation and risk assessment is a major source of homogeneity, especially along the credit cycle. The reliance on short-term funding and leverage is another source of homogeneity, especially when crisis hits, short-term funding dries up and firms are forced to de-leverage. One of the striking aspects of modern financial crises is not that there are so many sellers in a crash but that there are no or so few buyers.

Systemic resilience requires heterogeneity of views and behaviour. When assets fall from 100 cents in the dollar to five cents in the dollar, why are speculative long-term investors not buying them up? They do not because micro-



prudential standards on valuation, risk and solvency limits make it hard for them to do so, yet these limits make little sense for long-term investors with their superior capacity for holding liquidity and market risk. In the pursuit of standards, 'best-practices' and micro-prudence, regulation has artificially created homogeneity and systemic fragility. Where possible we must design micro-prudential regulations in a way that minimises their macro-prudential consequences and given that this will not always be possible we must complement micro-prudential regulation with macro-prudential regulation.