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The Great Game Will Never End: Why the Global Financial Crisis Is Bound to Be Repeated

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Abstract: This article re-examines key explanations of the Global Financial Crisis—product complexity, behavioural biases in decision making, systemic risk, and regulatory arbitrage and capture—and finds a common underlying cause, namely gaming by personnel at all levels in the banking sector and its regulators. This has enabled banks to use highly leveraged, maturity-mismatched investment strategies, which were designed so that the banks retained the upside rewards, but transferred the downside risks to taxpayers, leading to the privatization of profits and the socialization of losses—behaviour that has been described as 'banksterism'. Although governments have introduced some significant mitigatory measures, they will not be effective in preventing future financial crises, because they do not and, indeed, cannot provide the appropriate incentives to end the Great Game between bankers and taxpayers, which would involve making bankers, rather than taxpayers, personally liable for losses.

Keywords: behavioural biases; gaming; Global Financial Crisis; product complexity; regulatory arbitrage and capture; shadow banking; systemic risk

JEL Classification: G01; G21; G41

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1. Introduction

On 16 September 2008, the global financial system came within hours of collapsing. It began with an insurance company, when AIG (American International Group) in London could not meet the collateral payments on the credit default swaps (CDSs)[1] it sold on collateralized debt obligations (CDOs) and had to be rescued with an injection of $85 bn from the US Federal Reserve Bank (the Fed).

The crisis originated in the US banking and real estate sectors. However, institutional investors that only hold assets and do not engage in credit intermediation,[2] such as pension funds and life insurance companies, cannot just ignore what went on because their portfolios contain a large proportion of the bonds issued by banks and hence face substantial credit risk, their portfolios can suddenly become illiquid, and they face counterparty risk when using derivatives (such as CDSs). Similarly, members of the public cannot ignore what went on because they were very close to not having their wages deposited into their bank accounts and not being able to buy goods and services in shops with credit and debit cards.

This article re-examines key explanations of the Global Financial Crisis (GFC, 2007–2009)—product complexity, behavioural biases in decision making, systemic risk, and regulatory arbitrage and capture—and finds a common underlying cause, namely gaming by personnel at all levels in the banking sector and its regulators. This enabled banks to use highly leveraged, maturity-mismatched investment strategies, which were designed so that the banks retained the upside rewards, but transferred the downside risks to taxpayers, leading to the privatization of profits and the socialization of losses. This finding has not been fully explored in earlier studies of the GFC.[3] Although governments have introduced some significant mitigatory measures, they will not be effective in preventing

future financial crises, because they do not and, indeed, cannot provide the appropriate incentives to end the Great Game[4], which would involve making bankers, rather than taxpayers, personally liable for losses.

The outline of the paper is as follows. Section 2 covers the origins of the GFC. Section 3 reviews the principal explanations of the GFC, while Section 4 identifies a common underlying cause. Section 5 explains why there are no effective measures that could realistically be introduced to prevent gaming. Section 6 considers whether self-regulation or market-based regulation could be an effective alternative to government-imposed regulation. Section 7 concludes with the prediction that the Global Financial Crisis is bound to be repeated.

2. Origins of the Global Financial Crisis

Financial innovation and, in particular, securitization[5] have, since the 1970s, enabled banks in the US and other developed countries to use leverage[6] and maturity mismatch[7] to finance lending booms. Historically, all previous banking crises have been caused by excessive leverage and maturity mismatching, which, in turn, have often been incentivized by government regulation, such as deposit insurance.[8,9] They also always involve a speculative asset bubble, usually related to real estate, which is a particularly illiquid asset.[10] This is what happened this time too: an unsustainable increase in the price of housing and other real estate in the US.[11]

The situation was exacerbated by the bonus system operating in the banks. Because it rewards short-term profits, it encourages employees to engage in excessive risk taking. Take, for example, mortgage-backed securities (MBSs), the vehicles that were used to package up the sub-prime mortgages and sell on to investors as supposed AAA investments. Some of the biggest investors in MBSs were the banks themselves. Why? Because the bonus system encouraged bank employees to sell the MBSs to their own bank: more sales mean higher bonuses.

Associated with this was an expectation that governments would always support the banking system when it gets into difficulties with an accommodating monetary policy or other rescue or bailout package. This expectation goes back at least as far as the $160 bn US government bailout of around 1000 savings and loan associations between 1986 and 1995.[12] A view developed within the banking system, not only in the US but also in other countries such as the UK, that, however recklessly banks behaved, governments would always be there to bail them out by supplying liquidity to the financial system—both short term and long term by buying assets held by the banks though an 'asset purchase programme'[13] (which is an example of an accommodating monetary policy called 'quantitative easing' (QE) and is executed by central banks)—and, in extreme cases, by supplying capital to keep the banks afloat.[14] I will call this a 'government put', an implicit-free option that allows banks to invest in risky assets and if those investments fail, the banks will exercise their put option and oblige the government to buy up the now-worthless assets at an exercise price that keeps the banks in business.

Once house prices stopped rising and the bubble burst—as it inevitably would—mortgage defaults started increasing, and MBSs fell in value. As banks tried to unwind their positions, prices fell further and it became hard for banks to borrow against these securities, making the liquidity risk systemic, i.e., a liquidity crisis turned into a solvency crisis. The GFC started with the bankruptcy of investment bank Lehman Brothers on 15 September 2008, triggering a world-wide panic.[15]

3. Principal Explanations of the Global Financial Crisis

I argue that there are four principal explanations of the 2007–2009 crisis: product complexity, behavioural biases in decision making, systemic risk, and regulatory arbitrage and speculation. I consider these in turn.[16]

3.1. Product Complexity

3.1.1. Complex Products Issued by Regular Banks

It is not clear who really understood what was in the MBSs or how the markets would react to them in a financial crisis. Certainly, the senior management in the banks did not appear to know, because if they did, it is questionable whether they would ever have agreed to hold these securities on the books of their own banks.

What is clear, however, is that many structured products[17] in the banking system are too complex—and in many cases, the financial engineering is deliberately made difficult to understand. Although bankers like to claim they operate on the K.I.S.S. (Keep It Simple, Stupid) principle, the reality is that, all too often, they adopt the principle of K.I.C.S. (Keep It Complex, Stupid).

Some of these products also involve substantial leverage. Examples include collateralized debt obligations (CDOs) (of which MBSs are a particular example), synthetic collateralized debt obligations, collateralized debt obligation squareds (CDO-squareds), and collateralized debt obligation cubeds (CDO-cubeds)—for more details, see Box 1: Primer on securitized products.

When things go well, leverage magnifies the gains. However, when things go badly, leverage does the opposite and magnifies the losses. This is particularly the case when short-term borrowing is used to finance long-term loans to bank customers and other assets. This is the maturity mismatching that banks rely on to be profitable, since it is based on the expectation that the cost of the borrowing will remain below the return on the assets. However, in an extreme form, it can be calamitous. If the markets lose confidence in a bank, short-term interest rates can rise, or worse, the funding can dry up altogether very quickly and, if the central bank refuses to provide a lender of last resort facility,[18] the bank will be forced to call in the loans and/or sell its other assets in a fire sale.

The complexity of products will inevitably mean that the product design team will involve a number of people with different skills and not everyone will fully understand all aspects of the design. In fact, it is possible that no-one fully understands the product they are designing, or the consequences of the product being released onto the market. Even where they do have a good understanding of the product itself, they will have little understanding of the financial market consequences if a large number of investors attempt to sell the product at the same time—and the implications for the liquidity of the product or the systemic risk this could generate.

Box 1. Primer on securitized products.

Collateralized debt obligations (CDOs)[19]

These are complex structured finance products that are backed by a pool of loans and other assets, which provide the collateral if the loans default. They are an example of a credit derivative and were first issued in 1987 by Michael Milken at investment bank Drexel Burnham Lambert. They are then sold as marketable securities to institutional investors—a process known as securitization. From the issuer's perspective, a CDO is a vehicle for transferring risk and freeing up capital. Investors receive a schedule of debt repayments from the underlying loans. They anticipate above-average returns, but assume most of the risk in the event that borrowers default. CDOs are sold in two types of tranches: debt tranches and equity tranches. The debt tranches (which have senior, mezzanine, and junior levels) are similar to bonds and have coupon payments and credit ratings. The equity tranches do not have credit ratings and are paid out after all debt tranches. These tranches become the final investment products that are sold to investors.

Some CDOs have names that reflect the specific underlying assets. For example, **mortgage-backed securities** (MBSs)[20] contain mortgage loans, while **asset-backed securities** (ABSs) contain assets such as automobile loans, student loans, credit card receivables, and aircraft leases.

Other types of CDOs include **collateralized bond obligations** (CBOs)—investment-grade bonds backed by a pool of high-yield but lower-rated bonds—and **collateralized loan obligations** (CLOs)—single securities backed by a pool of corporate loans with low credit ratings or loans taken out by private equity firms to conduct leveraged buyouts.

Box 1. *Cont.*

CDOs have complex structures involving different teams of experts:

- Securities firms—approve the selection of collateral, structure the notes into tranches, and sell them to investors.
- CDO managers—select the collateral and often manage the CDO portfolios.
- Rating agencies—assess the CDOs and assign them credit ratings.
- Financial guarantors—promise to reimburse investors for any losses on the CDO tranches in exchange for premium payments.
- Investors—such as pension funds and hedge funds.

Some CDOs have simpler structures than other CDOs but can end up as components of more complex CDOs. MBSs are an example of this.

CDOs remained a specialist product until 2003–2004, when a US housing boom led CDO issuers to use sub-prime MBSs as a new source of collateral for CDOs. CDO sales rose from $30 bn in 2003 to $225 bn in 2006. CDOs were one of the worst-performing assets in the sub-prime collapse between 2007 and 2009, resulting in losses of hundreds of billions of dollars for some of the world's biggest banks, such as Citigroup ($39.1 bn), UBS ($37.7 bn), Merrill Lynch ($29.1 bn), and HSBC ($20.4 bn).[21]

Synthetic collateralized debt obligations[22]

Synthetic CDOs hold non-cash derivatives, such as credit default swaps (CDSs) and options. This increases the leverage on returns, as well as the risks.

Collateralized debt obligation squareds (CDO-squareds)[23]

These are more complex structured finance products, established via a special purpose vehicle (SPV). The structuring bank takes its CDOs and structures them into tranches with different maturity and risk profiles. These tranches then fund the payments to the investors in the CDO-squared SPV. This allows the bank to resell the credit risk in the CDOs it owns.

Collateralized debt obligation cubeds (CDO-cubeds)[24]

These are even more complex structured finance products, where now the backing comes from a CDO-squared tranche. It is a triple derivative—a derivative of a derivative of a derivative—and has been described as 'derivatives on steroids'. CDO-cubeds allow banks to resell the credit risk that they have taken once again, by repackaging their CDO-squareds.

Of course, certain players in the financial markets like complexity, i.e., have a **complexity bias**,[25] because they can use it to extract value from the ignorance of others, i.e., from people, typically end investors and taxpayers, who do not understand what is going on within these complex, highly leveraged products. This is an example of an **agency problem**, since the product designers have a conflict of interest.[26] They are agents who are supposed to act in the best interests of their customers, but they use product complexity (K.I.C.S.) to create an **asymmetrical informational advantage**[27] over their clients, which they then exploit for their own benefit.

The US Financial Crisis Inquiry Commission report (Financial Crisis Inquiry Commission 2011, pp. 127–29) highlighted the toxic nature of the products at the heart of the GFC:

> *In the first decade of the 21st century, a previously obscure financial product called the collateralized debt obligation, or CDO, transformed the mortgage market by creating a new source of demand for the lower-rated tranches of mortgage-backed securities.*
>
> *Despite their relatively high returns, tranches rated other than triple-A could be hard to sell. If borrowers were delinquent or defaulted, investors in these tranches were out of luck because of where they sat in the payments waterfall.*
>
> *Wall Street came up with a solution: in the words of one banker, they 'created the investor'. That is, they built new securities that would buy the tranches that had become harder to sell. Bankers would take those low investment-grade tranches, largely rated BBB or A, from many mortgage-backed securities and repackage them into the new securities—CDOs. Approximately 80% of these CDO tranches would be rated triple-A despite the fact that they generally comprised the lower-rated tranches of mortgage-backed securities. CDO securities would be sold with their own waterfalls, with the risk-averse investors,*

again, paid first and the risk-seeking investors paid last. As they did in the case of mortgage-backed securities, the rating agencies gave their highest, triple-A ratings to the securities at the top.

Still, it was not obvious that a pool of mortgage-backed securities rated BBB could be transformed into a new security that is mostly rated triple-A. But the math made it so.

The securities firms argued—and the rating agencies agreed—that if they pooled many BBB-rated mortgage-backed securities, they would create additional diversification benefits. The rating agencies believed that those diversification benefits were significant—that if one security went bad, the second had only a very small chance of going bad at the same time. And as long as losses were limited, only those investors at the bottom would lose money. They would absorb the blow, and the other investors would continue to get paid.

Relying on that logic, the CDO machine gobbled up the BBB and other lower-rated tranches of mortgage-backed securities, growing from a bit player to a multi-hundred-billion-dollar industry. Between 2003 and 2007, as house prices rose 27% nationally and $4 trillion in mortgage-backed securities were created, Wall Street issued nearly $700 bn in CDOs that included mortgage-backed securities as collateral. With ready buyers for their own product, mortgage securitizers continued to demand loans for their pools, and hundreds of billions of dollars flooded the mortgage world. In effect, the CDO became the engine that powered the mortgage supply chain. 'There is a machine going', Scott Eichel, a senior managing director at Bear Stearns, told a financial journalist in May 2005. 'There is a lot of brain power to keep this going'.

Everyone involved in keeping this machine humming—the CDO managers and underwriters who packaged and sold the securities, the rating agencies that gave most of them sterling ratings, and the guarantors who wrote protection against their defaulting—collected fees based on the dollar volume of securities sold. For the bankers who had put these deals together, as for the executives of their companies, volume equaled fees equaled bonuses. And those fees were in the billions of dollars across the market.

But when the housing market went south, the models on which CDOs were based proved tragically wrong. The mortgage-backed securities turned out to be highly correlated—meaning they performed similarly. Across the country, in regions where sub-prime and Alt-A mortgages were heavily concentrated, borrowers would default in large numbers. This was not how it was supposed to work. Losses in one region were supposed to be offset by successful loans in another region. In the end, CDOs turned out to be some of the most ill-fated assets in the financial crisis. The greatest losses would be experienced by big CDO arrangers such as Citigroup, Merrill Lynch, and UBS, and by financial guarantors such as AIG, Ambac, and MBIA. These players had believed their own models and retained exposure to what were understood to be the least risky tranches of the CDOs: those rated triple-A or even 'super-senior', which were assumed to be safer than triple-A-rated tranches.

'The whole concept of [asset-backed security] CDOs had been an abomination', Patrick Parkinson, currently the head of banking supervision and regulation at the Federal Reserve Board, told the FCIC.

3.1.2. Complex Products Issued by Shadow Banks

Another aspect of product complexity is that the products are frequently issued by organisations that have been classified as shadow banks. These are organizations that act like banks, but are not regulated like regular banks.[28] The Financial Stability Board (FSB)[29] defines shadow banks as all entities outside the regulated banking system that perform the core banking function, credit intermediation. The four key aspects of intermediation are maturity transformation, liquidity transformation, leverage, and credit risk transfer.[30]

There is evidence that shadow banks can help to enhance the efficiency of the financial sector by enabling more efficient risk sharing and maturity transformation, and by deepening market liquidity.[31] However, the concern is that shadow banks can continue to design

and introduce products whose complexities are not fully understood, but avoid the solvency and liquidity requirements of regulated banks, thereby contributing to systemic risk.

Kane (2013) coined the term 'shadowy banking' to include 'instruments such as swaps, repurchase agreements, futures contracts and AAA securitizations that may trade for substantial periods of time as if they carried zero counterparty risk. Of course, any instrument can trade this way if it is believed that authorities will be afraid not to absorb all or most of the losses its holders might suffer. The perception of a governmental "rescue reflex" is a key element of shadowy banking. It permits aggressive banks to back risky positions with the ex ante value of its contingent safety-net support (i.e., safety-net capital extracted from hapless taxpayers[32]) rather than stockholder equity'. He goes on to say: 'Shadowy banking might better be called "safety-net arbitrage". It covers any financial organization, product, or transaction strategy that—now or in the future—can opaquely (i.e., non-transparently) extract subsidized guarantees from national and cross-country safety nets by means of "regulation-induced innovation". This way of thinking about the safety net clarifies that taxpayers serve as its buttresses. It also implies that the shadowy sector is a moving target. It consists of whatever entities can issue a worrisomely large volume of financial instruments that, given the boundaries of current laws or control procedures, are either actually or potentially outside the firm grip of the several agencies currently charged with monitoring and managing the financial safety net'.

Congdon (2021, pp. 8–9) gives a UK example of shadow banking activity:

> *In the run-up to the crisis, banks had sidestepped regulation in the pursuit of profits, with one practice becoming widespread. If banks held mortgage assets on their own balance sheets in advance of securitization, extra capital would have to be held. The big banking groups therefore set up 'special purpose vehicles', as subsidiaries that did not have the legal status of banks. The SPVs were able to hold mortgage assets on a temporary basis before they were converted into security form, while their non-bank status meant that they required hardly any capital. The fees and profits from securitization would be the same as if the transactions had passed across banks' own balance sheets, but no capital charge would arise.*

It is clear from this that these SPVs were UK shadow banks issuing complex products in the run-up to the GFC.

3.1.3. Product Complexity Allows Banks to Create Fake Profits

Complex products allow banks to overstate key financial measures and create fake or illusory profits.

Kerr (2011) provides a key example: 'Recent developments in the accounting rules applied to banks, and in the broader regulatory framework for banks, have allowed bank executives to overstate their profits, feeding through into multi-million pound bonuses for themselves and short-term gains for their shareholders. When it comes to banks, accounting rules fail to perform their role of avoiding deception and consequent misallocations of capital. Given banks' financial inter-dependence, the scale of their assets and their central role in allocating capital across the economy, this failure is of much greater significance than it would be in other industries'.

He then explains how this is achieved:

The IFRS [International Financial Reporting Standards[33]] *allows the 'recognition' of years of hoped for future income as current profit today. [There are] six important shortcomings in the rules governing bank profit and capital reporting:*

- *Uncertain future cashflows can be recognized as certain by purchasing a credit default swap (CDS) or similar 'protection', even though the supplier of the protection is likely to default if the insured event occurs.*
- *Profits can be recognized from the increased value of assets, or decreased value of liabilities, on the basis of a market price, even though the totality of revalued assets or liabilities could not be sold at that price.*

- *Profits can be recognized from the increased value of assets, or decreased value of liabilities, even when the revaluation of assets is estimated, not by market prices, but by a model built by bank employees. This is the so-called mark-to-model approach to valuation.*
- *The net present value of uncertain future cashflows can be recognized as profits even when they are estimated using implausibly optimistic forecasts. This is a variation of the mark-to-model problem listed above.*
- *The EU's IFRS accounting system, voluntarily adopted by UK and Irish banks at the banking company level, is inconsistent with UK law.*
- *Banks need not make provision for expected losses when calculating their profit.*

Much of the activity in the banking sector is aimed at nothing more than exploiting these accounting rules to register inflated fake profits and hence convert shareholders' equity and, in extremis, debt-holders' and taxpayers' funds into executive bonuses.

3.2. Behavioural Biases in Decision Making

Behavioural biases (or traits) have been defined as 'irrational beliefs or behaviours that can unconsciously influence our decision-making process. They are generally considered to be split into two subtypes—emotional biases and cognitive biases. Emotional biases involve taking action based on our feelings rather than concrete facts, or letting our emotions affect our judgment. Cognitive biases are errors in our thinking that arise while processing or interpreting the information that is available to us'.[34] They can also be divided into group biases and individual biases. We consider some examples of each.

3.2.1. Group Behavioural Biases

There were three key group behavioural biases at work during the GFC: moral hazard, selection bias, and herding.

Moral hazard. The securitization of loans, in other words, the packaging together of loans (e.g., MBSs) and their onward sale to third-party investors, creates a potential moral hazard or conflict of interest.[35] This is because it reduces the incentive of the lender (e.g., a bank loan officer) to be careful when assessing the credit worthiness of the borrowers who are being offered the loans. An obvious example of this is NINJA (or sub-prime) mortgages. These are loans to buy real estate that are made to individuals who have 'no income, no jobs and no assets'. It was obvious that such people would never be able to repay the loans using their own income. Instead, they were relying on being able to repay the loan from the capital appreciation in their homes. However, this only works if house prices continually rise.

Since many bank loan officers knew that the borrowers were self-certifying their incomes, they were effectively conspiring—even if unwittingly—in a **fraud**.[36] There would have been much less incentive to do this if the loan was going to remain on their bank's books. This is because the bank loan officers would then be much more careful with how they screened customers. They would be careful not to lend money to people who did not have the resources to repay the loan. However, when they know that the loans were going to be packaged up and sold on to investors who will never see the original borrowers and when more loans mean a bigger bonus to the loan officer, then the conflict of interest is obvious. This is a clear example of moral hazard, and many bank loan officers across all major banks were engaged in the process.

Another example of moral hazard relates to the credit rating agencies and their role in properly assessing the risks in MBSs. They collectively gave these securities a AAA status when they contained the worst form of junk, and they were paid to do this by the creators of the MBSs.

Mervyn King, the Governor of the Bank of England during the GFC, described the exposure of the state, and hence, taxpayers, to the potential losses of the banks as the 'biggest moral hazard in history'.[37]

Selection bias. This arises when, as a result of asymmetric information, there is a bias in the selection process, which leads to the group being selected not being representative of

the population. An example is **adverse selection** in bank lending, where borrowers who know they are a poor credit risk are willing to take out loans at high interest rates, since they know that they will not be able to repay either the loan or the high interest. The bank loan officers are, of course, aware of this issue, and attempt to mitigate it by acquiring sufficient collateral.[38] However, in the case of NINJA mortgages, the only 'collateral' was the hope of continuous increases in house prices (in other words, hot air).

A related form of selection bias is **automation bias**, the tendency to over-rely on automated systems, which can lead to inaccurate automated information overriding appropriate decisions.[39] Linked to this is **survivor bias**, i.e., concentrating on those who have 'survived' a selection process and ignoring those who have not. Both biases compound the initial selection bias.

Herding. Virtually all investment banks[40] were buying into sub-prime, and the reason was simple: 'If everyone else is doing it and we are not, we must be wrong. They must know something that we don't. We must go along with them, since we do not want to stand out from the crowd'. So, rationality disappears from the decision-making process and everyone joins the herd. This is an example of **groupthink**.[41]

Herding is a very common behaviour in the financial markets. For example, fund managers are prone to herding. Even established fund managers tend to invest in assets because other people are investing in them. After all, if the investment goes sour, there is comfort in all being wrong together. There is no comfort in being there on your own when everyone else has bought into a successful investment and you have not.[42] A large part of this is explained by **reputational risk**—the risk of underperforming in the peer-group of fund managers.[43] The same applies to banking.

3.2.2. Individual Behavioural Biases

There are a number of behavioural biases to which most participants in the banking and wider financial system are prone.

Overconfidence by decision makers in banks.[44] People tend to overestimate their own knowledge and ability and they tend to underestimate the risks they face. Overconfidence also frequently leads to **excessive risk-taking behaviour**, particularly in the financial services industry.[45] An extreme example of this is **reckless behaviour bordering on the psychopathic**, which some have proposed as an explanation for the crisis.[46]

Associated with overconfidence is the **illusion of control**.[47] People tend to exaggerate their ability to control events or outcomes. To illustrate, we all know that the outcome from tossing a fair coin is random. There are features of the financial system, such as share price movements, which are also pretty close to being random,[48] yet many individuals believe they can identify patterns in the movement of share prices, which can be used to predict future share price movements and this gives them the illusion of control. The illusion of control is certainly what Richard S. Fuld Jr, the Chief Executive Officer of Lehman Brothers, one of the few US banks to collapse during the GFC,[49] appears to have felt—although he subsequently blamed bad regulations for the bank's collapse.[50]

Also associated with overconfidence is the **illusion of knowledge**.[51] This is the misperception that the accuracy of forecasts about the future comes from having more information. If you have more information today, you will be able to predict better what is going to happen in the future. Another aspect of the illusion of knowledge is that people are afraid to admit that they do not fully understand something, so they carry around a partial and often inaccurate understanding. When you are a new recruit, you can ask the question: 'I don't understand this, can you please explain it to me?' However, as you go higher and higher up the management and seniority chain, you feel that you can no longer ask this question. You have to say that you fully understand what is going on and so you pretend that you understand the products that your organization is designing and marketing.

This is what happened in Barings Bank, for example, which was bankrupted by one of its derivatives traders Nick Leeson[52] in 1995. In 1993, Barings chairman Peter Baring had

stated: 'Derivatives need to be well controlled and well understood, but we believe that we do that here'.[53] Related to this is **authority bias**, the tendency to attribute greater accuracy to and be more influenced by the views of a person in authority.[54]

Availability heuristic. People tend to give greater weight to more recent information whether relevant or not. The opposite holds, so, for example, more distant events are given lower subjective probabilities until a point is reached when the probability is set at zero (the **threshold heuristic**). A relevant example of this is **disaster myopia**, the propensity to underestimate the probability of a distant previous disaster—such as a financial crisis repeating itself.[55]

Confirmation bias. This is the tendency to seek, interpret, or recall information in order to confirm your beliefs or hypotheses. Related to this is the **illusion of validity**. This is the tendency to overestimate the reliability of your judgments, especially when available information appears to corroborate your views.[56]

Then there is what psychologists call **cognitive dissonance**[57] and **avoiding regret**. People wish to avoid conflicted feelings by changing beliefs so that they are consistent with past decisions. Many people are prone to this, since they do not like being wrong. They do not like regretting, so they change their view of the world to fit in with how the world turned out.

A more extreme behavioural trait is **dissociation**, which involves some form of disconnection from physical and emotional experiences.[58] It is regarded as a coping or defence mechanism.[59] It can also involve **blame shifting** and **escaping responsibility**.[60] Fuld's blaming of bad regulations for Lehman's collapse is consistent with these traits.

Loss aversion. People tend to have an aversion to making losses. This results in people feeling much worse about a loss of a given size than the good feeling they experience when they make a gain of the same size. Experiments show that for every $1 possible loss that an investment might make, there would need to be the possibility of a gain of more than $2 before an investor would consider holding such an investment.[61]

Disposition effect.[62] This is the tendency of investors to sell shares whose price has increased, but to hold on to loss-making shares. Your investment has gone up, so you had better take your profits in case the gain is reversed. However, when your investment has made a loss, you do not want to realize the loss; instead, you hold onto it, hoping that the investment will recover in value and then you can get out. Both these tendencies are known to reduce the long-term returns that investors achieve. A wise investment rule in finance is to run your profits and cut your losses, and to know when to do both. There are very few investors who are able to do this. The majority of investors are subject to a disposition effect.

This is clearly linked to loss aversion. The disposition effect was present in the GFC, but initially in a different form to the standard form. In the case of the GFC, it is linked to the moral hazard and adverse selection issues discussed earlier. It was a way of offloading NINJA mortgages through securitization while they were still showing a profit and before they started showing losses. Of course, the standard form of the disposition effect began to operate once they were in the hands of loss-averse end investors who insisted on holding on to loss-making investments until they recovered in value. Unfortunately, in the GFC, they never did.

Number numbing. The size of the numbers involved in the financial market is enormous: a billion, tens of billions, a trillion. These figures are meaningless to most people and so a sense of unreality sets in when discussing transactions of these orders of magnitude.[63]

Finally, there are **cycles of emotion**. We need to recognize that the players in financial markets are prone to feelings of exuberance, greed, followed by fear. The 'Minsky moment' arrives. This is named after Hyman Minsky, the American economist, who said that there comes a point at the top of a speculative bubble, no one knows quite when it will be, when it becomes clear that the bubble cannot go on. Everyone turns very suddenly away from a

feeling of exuberance to one of fear. The fear turns to panic, and everyone tries to sell, and that is when a liquidity crisis starts—which soon turns into a solvency crisis.[64]

3.3. Systemic Risk

I adopt the following definition, taken from Besar et al. (2011, para 5.9.1): 'A systemic risk materializes when an initial disturbance is transmitted through the network of interconnections that link firms, households and financial institutions with each other, leading, as a result, to either a breakdown or degradation of these networks'.[65]

Bank systemic risk was an important explanation for the GFC.[66] There are four groups of networks of interconnections in banking that can be subject to systemic risk:[67]

- The payments systems and other interbank infrastructure. The key systemic risk in 2008 was the danger that the payments system would collapse and that companies would not be able to pay wages into their employees' bank accounts and consumers would not be able to pay for goods and services in shops. The real economy would have stopped in its tracks if the payment system had failed.
- The short-term funding market. The wholesale (or interbank) funding market is the classic example of a short-term funding market and, when banks lose confidence in each other and hence stop lending to each other, the risk can become systemic.
- Common exposures to collateral markets, securities markets, and derivatives markets.
- Counterparty exposure to other financial market participants, particularly in the over-the-counter (OTC) derivatives markets.

Two of these networks of interconnections have played a major role in almost all historical banking and financial crises: the short-term funding market and common exposure to real estate collateral. The short-term funding market can become a problem when it is used to fund long-term investments on the basis of short-term loans, which need to be rolled over on a regular basis, and there is a loss of confidence in a borrower's ability to service the loan due to a collapse in the value of the underlying assets.[68] Then there is the common exposure to assets that generate a speculative bubble. The asset involved is usually real estate.[69] In other words, the availability of short-term funding to finance real estate allows an unsustainable expansion of credit.

How does systemic risk arise? It almost always arises in the banking sector. It is extremely unlikely to occur in other sectors of the financial system, such as pension funds or insurance companies. This is because only banks create credit and only banks engage in maturity mismatching to the extent required to generate a financial crisis. However, the definition of the banking sector needs to be widely drawn to cover shadow banking.

Once started, systemic risk can spiral out of control (i.e., became contagious[70]) due to inappropriate regulatory responses, such as pro-cyclical solvency regulations and liquidity requirements that have the perverse effect of destabilizing the financial system in a crisis.[71] These required banks to sell their assets to meet their liquidity ratios[72] because they could no longer access the wholesale funding market. This meant that banks were forced to sell assets in an illiquid market, i.e., conduct a fire sale, accepting whatever price was offered in an attempt to ward off insolvency. In other words, the regulations had a pro-cyclical destabilizing effect, which contributed to the crisis (indeed made systemic risk more likely), rather than help to counteract it.

An additional reason why the systemic risk in the GFC generated a spiral was the inadequate capitalization of some of the other institutional participants.[73] For example, the banks were exposed to insurance company counterparties, so while the insurance industry as a whole cannot cause systemic risk,[74] certain insurance companies were systemically risky. The classic examples are AIG and the monoline insurers that insured the MBSs and gave them their 'AAA' rating. These insurers were operating as shadow banks—as Gelzinis (2019), for example, points out—and were grossly undercapitalized for the risks that they were assuming and that, in turn, meant that the banks became exposed to them. So, the

insurers were exposed to the banks, and the banks, in turn, became exposed to the insurers in a classic downward spiral.

3.4. Regulatory Arbitrage and Capture

The fourth explanation for the GFC lies in regulatory arbitrage and regulatory capture, which I discuss in turn.

3.4.1. Regulatory Arbitrage

This is the 'practice whereby firms capitalize on loopholes in regulatory systems in order to circumvent unfavourable regulations. Arbitrage opportunities may be accomplished by a variety of tactics, including restructuring transactions, financial engineering and geographic relocation to amenable jurisdictions'.[75]

The banking sector is particularly adept at circumventing what it sees as excessive regulations relating to capital requirements. Dowd (2014) argues that banks engage in 'risk-weight "optimization" —exploiting the loopholes and inconsistencies in the system via regulatory arbitrage, in effect gaming both the denominator and the numerator in the risk-weighted capital ratio. In so doing, they hijacked the system into a race to the bottom'. He provides an example of each.

As an example of arbitraging the numerator (i.e., capital) in the Basel capital ratios:

> *Basel I had a simple bare-bones definition of bank capital, common equity. However, Basel II based its capital ratios on more complex definitions: Tier 1, defined as share capital plus reserves minus various regulatory deductions and intangibles including especially goodwill; and Tier II, or supplementary bank capital, such as revaluation reserves, undisclosed reserves, and various forms of hybrid and subordinated debt. Minimum capital charges were 4 percent and 8 percent, respectively, of Tier 1 and Tier 2 against risk-weighted assets. So the banks developed new and less expensive but weaker forms of capital to meet these definitions, Tier 1 especially: gaming Tier 1 was a veritable cottage industry. The net result was that regulatory capital was artificially inflated with less stringent capital instruments—especially various forms of contingent convertible or CoCo instruments[76]—again making the banks appear stronger than they really were. To its credit, Basel III involves a move back toward more robust capital definitions, but even these are still gameable.*

As an example of arbitraging the denominator (i.e., risk-weighted assets) in the Basel capital ratios:

> *In 2002, Gordon Kerr and his colleagues working in the investment banking unit of a major UK bank came up with an ingenious scam to game the Basel capital rules. This arrangement produced immediate (but illusory) profits to the bank, created fictitious 'virtual' capital and nice bonuses for all concerned, while leaving the bank's real risk exposure almost unchanged.*
>
> *Here is how it worked. The bank had a bond portfolio worth over $4 billion, which had been guaranteed by a US insurer to ensure a AAA credit rating, and UK capital rules required that 8 percent of this value, or $320 million, be set aside as capital. Kerr and his colleagues then persuaded the US insurer to enter into a credit derivative contract with a European bank, which in turn wrote a matching credit derivative in favor of the UK bank. This transaction enabled the bond portfolio to be reclassified as a credit derivative and attract a regulatory capital requirement of 0.5 percent rather than 8 percent. The UK bank could then treat the transaction as raising $300 million: 15/16 of the $320 million was released. The transaction was engineered around the rule, and the release of capital was a chimera.*
>
> *A side effect was that profits could be brought forward and, under the lax accounting rules of the time, rather than recognizing the profit on the loans periodically as the loan margin was actually paid, the bank booked as profit on execution the entire 30 years' expected earnings for that part of the lending margin that now flowed through its derivative book.*

> *The other two parties were more or less unaffected. The US bank earned an accommodation fee for the paperwork, but its economic position was unaltered because it was only guaranteeing the same assets again—and from its perspective, the second guarantee was redundant—hence pig on pork. For its part, the European bank earned an accommodation fee for taking very little exposure.*
>
> *The trick with credit derivatives is to define the circumstances under which they pay out: in this case, the financial engineers were careful to ensure that because the US entity was guaranteeing the assets twice (via the guarantee and derivative), then the European bank's derivative would not trigger until the UK bank had claimed under the guarantee. All very simple really!*
>
> *Senior management didn't understand the scheme, but no one cared. This securitization was widely copied, and Mr. Kerr later found himself wondering why it took the banking system so long to collapse.*[77]

As an example of potential jurisdictional regulatory arbitrage, on 27 October 2021, the European Commission announced that it would not implement some of the final parts of Basel III and this would allow EU banks to use less capital when they make loans to companies without a credit rating, thereby reducing their lending costs.[78] This could enable EU banks to lend more cheaply to UK companies than UK banks could. A senior UK bank executive said: 'It's a big issue. There's a risk that [EU banks] can lend to a load of higher quality UK corporates at cheaper rates than UK banks. . . . Open markets only work if everybody is playing by global rules'.[79]

Dowd (2014) also identifies the 'ever-growing complexity' of bank-capital regulation as a problem. Although this is based on the belief that 'more sensitive risk-weighting would produce greater risk sensitivity', he views this belief as mistaken, because:

- *It ignores the risks that come from modelling itself. If model risk is sufficiently large—and the evidence suggests it is massive—then the noise in the model can drown out the signal; a much simpler approach might work better because it is unpolluted by model risk.*
- *It ignores aggregation issues—that the risks across banks' portfolios, taken as a whole, may bear little relation to the risks of each part. The focus has been on the micro risks, and there has been relatively little attention to the correlations among them that really determine aggregate risks.*

So not only is there the problem of product complexity, but there is also increasing regulation complexity. These factors simply enhance the opportunities for regulatory arbitrage.

3.4.2. Regulatory Capture

This occurs when the regulator, instead of acting in the interests of end customers and the wider public, acts in ways that benefit the existing firms in the industry that it is responsible for regulating.[80] The regulator is seduced into believing that the interests of consumers are best served by reducing onerous regulations on incumbent firms, restricting competition by blocking 'unsuitable' new companies from entering the industry, and, in the extreme case, bailing out existing firms when they get into difficulty.

The 'government put' is a classic example of this. Andrew Haldane, then Executive Director for Financial Stability at the Bank of England, provided a UK example of this in a speech entitled 'Why banks failed the stress test'.[81] He discussed what he called the 'Golden Decade' (between October 1998 and June 2007) of bank financial risk management following the stock market crash of October 1987 and the failure of the hedge fund Long Term Capital Management (LTCM) in September 1998. Both led to the introduction of new risk management tools, such as 'value at risk' (VaR)[82] and, in particular, the RiskMetrics and CreditMetrics models released by JP Morgan in 1996 and 1997, respectively. The Basel Committee on Banking Supervision (BCBS) brought VaR into the Basel II framework for

determining bank regulatory capital. It is used to stress test bank balance sheets against market risk.[83] The plan was for Basel II to be introduced between 2006 and 2009.[84]

As Basel II was being introduced and before the GFC, the Bank of England held a series of seminars with banks to better understand their stress-testing practices. The seminars revealed that banks only conducted modest, not extreme, stresses and one of the bankers present revealed to Haldane the reason:

> *There was absolutely no incentive for individuals or teams to run severe stress tests and show these to management. First, because if there were such a severe shock, they would very likely lose their bonus and possibly their jobs.*[85] *Second, because, in that event, the authorities would have to step-in anyway to save a bank and others suffering a similar plight.*
>
> *All of the other assembled bankers began subjecting their shoes to intense scrutiny. The unspoken words had been spoken. The officials in the room were aghast. Did banks not understand that the official sector would not underwrite banks mismanaging their risks?*
>
> *Yet history now tells us that the unnamed banker was spot-on. His was a brilliant articulation of the internal and external incentive problem within banks. When the big one came, his bonus went and the government duly rode to the rescue.*

Haldane argues that the problem is a consequence of **misaligned incentives** and **time-inconsistency**.[86] Bankers were incentivized to use a modest stress test because they did not want to lose their jobs or bonuses, and further, the time-inconsistency problem 'weakens incentives for banks to consider for themselves large-scale risks to their balance sheet which might induce failure. The safety net [of a modest stress test] becomes a comfort blanket, the backstop a balm. And the greater the risk these institutions themselves pose in the event of failure, the weaker the incentives to manage risk'. In short, stress-testing is used as '**regulatory camouflage**'.

3.4.3. Examples of Regulatory Capture in the Regulated Banking Sector

We consider some examples of regulatory capture in the regulated banking sector in three different jurisdictions: the UK, US, and EU.

The United Kingdom

Despite Haldane's awareness of regulatory capture, his employer, the Bank of England, was in on the act. In the example cited earlier by Congdon (2021, pp. 8–9) involving UK banks holding mortgage assets in SPVs to reduce regulatory capital, Congdon states that the Bank 'was aware of these [regulatory arbitrage] developments', implying it was condoning what was happening or at least turning a blind eye.

A second example also concerns the Bank of England. The Bank Governor Mark Carney stated that the 2015 stress tests indicated evidence of a 'Great Capital Rebuild' and that 'new capital requirements are at least seven times the pre-crisis standards for most banks. For globally systemic banks, they are more than ten times'.[87] Dowd (2017a, 2017b) argues that the Bank's own *Financial Stability Reports* of July and November 2016 demonstrated that this was far from the case. The market value 'simple leverage ratio' (the market value of shareholder equity to average total consolidated assets) of UK banks was 8% in 2006 and 5.28% in November 2015, representing a decrease of 34%, implying that UK banks were more highly leveraged in 2015 than they were going into the crisis. The leverage factor (which is sometimes just called leverage) is the inverse of the leverage ratio and was 12.5 (=1/0.08) in 2006 and 18.94 (=1/0.0528) in 2015, that is, 52% higher.

Further, the book value of the Big Four UK banks' total Common Equity Tier 1 (CET1)[88] capital was approximately £205 bn (the market value was only £149 bn) in 2016, which is just £90bn higher than the £116bn Tier 1 capital that they had going into 2007. Given total assets in 2016 of approximately £5 trn, the banks' average CET1 leverage ratio (ratio of CET1 capital to total assets) was 4% on the basis of book values and 3% on the basis of market values.

Dowd (2017b) continues: 'By the first measure, UK banks are leveraged by a factor of 1 divided by 4 percent or 25: they have £25 in assets for every £1 in capital; and by the second measure, they are leveraged by a factor of over 33. These are high levels of leverage that leave the banks vulnerable to shocks—and high levels of leverage, aka inadequate capital, were a key factor contributing to the severity of the GFC. Putting all this together, the evidence for a 'Great Capital Rebuild' is not there—especially if one pays attention to the market value numbers'. Dowd (2017a) concludes 'in terms of actual capital-to-asset ratios, we are . . . about 1.5 (not ten) times higher than 2006–2007, the eve of the crisis. And these are book-value figures. In terms of market values, the Bank of England's own data suggest that UK banks' capital ratios are well below what they on the eve of the crisis'. The clear implication is that the UK banks' regulator is covering up for the banks—as any good captured regulator would do.

An even more egregious example concerns the LIBOR scandal[89] and the two whistle-blowers who went to jail. The scandal involved the collusion between traders at key global banks—including Barclays, the Royal Bank of Scotland, Deutsche Bank, Citigroup, and JPMorgan Chase—to manipulate the setting of the London Interbank Offered Rate, a global benchmark interest rate, between 2003 and 2012. This resulted in the mispricing of derivatives contracts—as well as corporate loans and mortgages—in a direction that favoured the trading positions of the LIBOR manipulators. The manipulation typically required a lower level of LIBOR than the true market rate, since the banks wanted to give the impression that they could borrow in the interbank market at lower rates than they actually could—and this became known as 'lowballing'. The damage to the reputation of the financial services industry, especially in London, was enormous when the scandal was exposed—and the banks involved were subject to regulatory fines of $9 bn.

However, the worst part of the scandal was that two Barclays traders, Peter Johnson and Colin Bermingham, were jailed despite warning senior managers at Barclays that the lowballing was taking place and being repeatedly instructed by those same managers to continue with the lowballing fraud—and being informed that support for this action came from the very top, namely the Bank of England and Downing Street. On numerous occasions in 2007 and 2008, Johnson and Bermingham warned the US regulator, the Fed, that the banks were misreporting the interest rates they were paying to borrow US dollars. One example of this is a phone call on 11 April 2008, just months before the GFC, in which Bermingham informs a Fed official that Barclays, like other banks, is not posting 'honest' estimates of the cost of borrowing funds. The official says she understands fully but does not report a crime.

How is all this known? Because the traders' phone calls were recorded, and when the scandal broke, Barclays legal department was required to hand over the tapes to the authorities, including the UK Serious Fraud Office (SFO). Despite their whistleblowing, Johnson and Bermingham were prosecuted by the SFO—in full knowledge of the tapes' contents. In 2014, Johnson was found guilty of conspiring to manipulate LIBOR and jailed for 4 years. Judge Anthony Leonard commented: 'What this case has shown is the absence of integrity that ought to characterize banking'.[90] In 2019, Bermingham—along with another trader—was found guilty of conspiring to manipulate EURIBOR, the euro-based version if LIBOR, and jailed for five years. Lisa Osofsky, director of the SFO, said: 'These men deliberately undermined the integrity of the financial system to line their pockets and advance the interests of their employers. We are committed to tracking down and bringing to justice those who defraud others and abuse the system'.[91]

Yet no senior managers or executives at any of the banks was ever prosecuted. Barclays Chief Executive Officer Bob Diamond denied that there was any pressure from the Bank of England or the UK Government to lowball, despite a phone call on 29 October 2008 from Paul Tucker, Executive Director for Markets at the Bank of England, informing him that 'senior figures' in the UK Government were questioning why Barclays' LIBOR rates were always so high—with the clear implication that Barclays must be struggling to get the funds it needed to survive the GFC and might have to be nationalized, as Lloyds

and Royal Bank of Scotland were, something the Government dearly wanted to avoid. On 31 October 2008, just two days after the call, Barclays received an injection of capital of £7.3 bn from investors, mostly from Qatar and Abu Dhabi, and so was able to avoid insolvency and nationalization.[92]

All this only came to light because, in 2022, the tapes were leaked to Andy Verity, the BBC's economics correspondent.[93] He reported the story in a remarkable series of podcasts called 'The Lowball Tapes'.[94] The Fed declined to comment on the tapes, but in a statement in 2012, it said it had received 'occasional anecdotal reports from Barclays of problems with LIBOR' in 2007, and 'shared suggestions for reform with relevant UK authorities'.

If ever there was an example of global regulatory capture and conspiracy to protect the banking sector in the face of criminal activity and prosecute only the little guys, this is it.

At the time of writing, there were calls from a number of organizations, such as the Transparency Taskforce, for a full and independent inquiry, because:

- *There have been several miscarriages of justice that need to be comprehensively and independently investigated—people have wrongly been sent to jail.*
- *Those that have done wrong ought to be investigated, and if appropriate, prosecuted and perhaps even jailed.*
- *There has been a cover-up by the UK Government, the banks, [financial regulators] and so on.*[95]

The United States

The US example of regulatory capture in the regulated banking sector concerns the US Dodd–Frank (Wall Street Reform and Consumer Protection) Act of 2010, which was introduced in response to the GFC and whose aim was to 'promote the financial stability of the United States by improving accountability and transparency in the financial system, to end "too big to fail", to protect the American taxpayer by ending bailouts, to protect consumers from abusive financial services practices, and for other purposes'.[96]

Kane (2020) argues that:

> *Dodd-Frank is an example of counterfeit reform. It is designed principally to benefit very big banks and it has helped these banks to increase their market share greatly during the last 10 years. The Act provides lesser and contradictory forms of costs and comfort to smaller US bankers and taxpayers, foreign bankers (especially the managers of Deutsche Bank*[97]*), and foreign governments. Small bankers and taxpayers are encouraged to believe that the 2007–2009 US rescue of the world's biggest banks was a one-time manoeuvre. But an opposite message is sent through the press as (with great fanfare) the industry absolves and congratulates ex-officeholders: (1) for having transferred massive amounts of subsidized support not just to stakeholders in US megabanks, but also to European bankers and governments, and (2) for keeping the subsidies flowing long past the panic's expiry date. Genuine reform will require changes in fraud laws and an effort to post on a continuing basis the value of the safety-net subsidies individual megabanks enjoy. Taxpayers deserve to know not only about the size of particular credit flows but about the flow of day-by-day subsidies buried in the 'liquidity' support that the Fed provided.*

So, in Kane's view, Dodd-Frank does the precise opposite of 'improving accountability and transparency in the financial system, [ending] "too big to fail", [and protecting] the American taxpayer by ending bailouts'.

The European Union

The final example concerns the Eurozone (EZ) banking and sovereign debt crises between 2008 and 2012. The banking crisis began with the collapse of Iceland's banks in 2008, followed by those of Portugal, Italy, Ireland, Greece, and Spain in 2009. Non-performing property loans were at the heart of the crisis. EZ governments tried to bail out their banks, but the scale of the problem was so great that the banking crisis turned into a sovereign debt crisis, as the governments found that they were unable to borrow from the markets and were forced to rely on funding from the European Central Bank (ECB), the

International Monetary Fund (IMF), and the European Financial Stability Facility (EFSF).[98] There was active collaboration between EZ governments and the banking sector to cover up the full extent of the banking crisis, while, at the same time, protecting domestic depositors over international depositors.

This is how it happened. The Eurosystem[99] uses misleading accounting practices—such as the non-standard treatments of non-performing bank loans, accounting practices that fail to recognize the sub-sovereign nature of EZ member states,[100] and Eurosystem accounts that lack transparency —to hide the true extent of the EZ banking crisis—as pointed out by Reynolds et al. (2020, p.6): 'The EU has permitted banks to securitize NPLs [non-performing loans] and repackage them, with guarantees by the relevant Eurozone member state where the borrowers are located. It then permits EU banks to hold the resulting securitized NPLs at a level reflecting a sovereign treatment of the EU member state guarantee. This has an alarming similarity with the repackaging of US sub-prime mortgages into supposedly "prime" segments that sparked the Global Financial Crisis'. In addition, 'Eurosystem accounts are opaque. They do not list all public debt in the manner of other developed countries, such as the UK or US. The system runs four different sets of accounts, but, when consolidated, it assumes the amounts owing between NCBs and the ECB can be netted, thereby disregarding the intrasystem gross exposures. It is unclear whether this assumption is legitimate even under EU law'.

Further, in the context of the resolution of a bank that is seen to be 'failing or likely to fail', a EZ government has the power, under the 2014 Bank Recovery and Resolution Directive (BRRD)[101], to 'bail-in' creditors, i.e., write off a bank's equity holdings and write down its subordinated debt, and then its senior debt, up to a point where this allows the bank to continue in business, while ensuring the protection of retail depositors, up to a limit of €100,000 in their accounts.

However, EZ governments have responded to such cases by seeking to avoid pain for local retail investors, circumventing the BRRD rules by ever-more ingenious and increasingly questionable methods. They have sought to target international wholesale investors by bailing-in their debt and minimizing the bail-in for local individual taxpayers, local retail investors in bank equity, or debt and local depositors.[102] In this case, the regulatory capture extends to deliberately discriminating against non-domestic bank customers.

3.4.4. An Example of Regulatory Capture in Shadow Banking

Gelzinis (2019) provides an example of regulatory capture in the shadow banking sector—by the government itself. It concerns the US Financial Stability Oversight Council (FSOC). This was set up by the Dodd–Frank Act to address the failures in systemic risk oversight. The Act gave the FSOC the power to designate shadow banks as systemically important. Once designated, a shadow bank is subjected to strong Federal supervision and enhanced regulation.

Gelzinis points out that:

> *The Obama administration used the FSOC's mandate and authorities to improve the resiliency of the financial system. In stark contrast, the Trump administration has rejected the council's mission, undermined its tools, and eroded its institutional capabilities. Treasury Secretary Steven Mnuchin's*[103] *tenure as FSOC chairman has demonstrated vulnerabilities in the council's design and authorities.*
>
> *At its core, the council's inherent weaknesses stem from a misplaced faith that competent regulators with a desire to meet the FSOC's statutory goals will always be in place. It is far too easy to erode the council from within, and there is a substantial embedded bias against forceful use of the FSOC's tools. The current framework also fails to contemplate the risk posed by conservative judges who are committed to defanging*[104] *regulatory authorities in favour of business interests.*

To counteract this, Gelzinis put forward some proposals designed to 'reorient the shadow banking regulatory framework toward precaution and the public interest, with

policymakers tasked with protecting the real economy from shadow banking risks rather than with protecting shadow banks from prudent regulation'. He argues that the following policy recommendations would limit the chances that shadow banks and their activities cause or exacerbate the next crisis:

- Enhancing the shadow bank designation authority. *Shadow banks that meet certain size thresholds—and at least one additional quantitative risk metric—would be automatically designated as systemically important. These firms would be subject to enhanced oversight and regulatory safeguards. It is currently exceedingly difficult to designate a shadow bank as systemically important but easy to undo a designation. This bias against strong regulation of shadow banks works against the FSOC's mission to protect the real economy by mitigating risks to financial stability.*
- Granting the FSOC authority over systemically risky activities. *Providing the FSOC with direct rule-making authority to regulate systemically risky activities across the financial system would help it better fulfil its mission to mitigate threats to financial stability in all forms. The FSOC's current ability to research and evaluate systemically risky activities—and its authority to issue nonbinding recommendations—is insufficient.*
- Improving the FSOC's institutional capabilities. *The FSOC's independent source of funding is an important element of its institutional design, but that funding structure and associated discretion can be used as a weapon when the chair and FSOC members do not value the institution. This policy recommendation would set minimum budget and staffing floors at the FSOC and the Office of Financial Research (OFR). It would also enhance the OFR's independence and data-collecting authority.*
- Increasing the FSOC's transparency and accountability to both Congress and the broader public. *For example, the FSOC would be required to release transcripts of its meetings on a five-year time delay and release meeting minutes three weeks after each meeting.*

Gelzinis concludes: 'The Trump administration and conservative judges have exposed significant vulnerabilities in the current regulatory regime for the shadow banking sector. These policy recommendations would address these vulnerabilities and limit the chances that shadow banks and their activities trigger or exacerbate another financial crisis'.

It looks like the psychopaths who did so much damage in 2007–2009 have still not left the stage. While Gelzinis's proposals are specific to the US, they could, with suitable modifications, be adapted to prevent this type of regulatory capture in other jurisdictions.

4. The Great Game: Gaming Was the Common Underlying Cause of the Global Financial Crisis

The four principal explanations of the GFC discussed in the previous section had a common underlying cause, namely gaming by key participants in the banking sector and their regulators.

The first explanation is the complexity of financial products issued by banks. This complexity is quite deliberate and has one key objective, namely to economize on bank capital. Tavakoli (1998, p. 241) explains how this is achieved using credit derivatives: 'The driving force for this revolution in banking is the fact that the [Basel] risk weighting of the trading counterparty will become irrelevant. The magnitude of the credit exposure as expressed by trading models will determine regulatory capital requirements. All banks will have an incentive to figure out ways to move assets from the bank book to the credit derivatives trading book. Trades, which did not make sense from a past regulatory capital perspective, will make sense in future whether the bank is buying or selling credit protection. The regulatory capital charge in the trading book is a fraction of the charge in the bank book, and exposure netting makes trading book management viable. Banks will buy credit default protection from non-bank institutional investors with no concerns about the [Basel] risk weight of the protection seller'. This was written in 1998. By 2002, Gordon Kerr[105] and other investment bankers around the world were busy implementing this strategy of moving business from the bank book to the trading book in order to reduce regulatory capital—and exactly ten years after the publication of Tavakoli's book, the GFC happened.

At the same time, it is clear that many people, including bank senior management, did not understand the systemic implications of these complex products. De Bruin (2015) argues that incompetence was worse than greed when it came to the GFC.

This perverse behaviour—on the one hand, favouring complexity, while, on the other hand, not fully understanding it—has always existed in the financial sector, and we should recognize that it is likely to be a permanent feature of the way in which the sector operates. It is just part of the Great Game.

The second explanation is that behavioural biases pervade decision making at all levels of the banking industry. All the examples that I gave above were to a greater or lesser extent involved in the GFC. To take just one illustration, securitization, which, in principle, is one of the great contributions of modern capital markets, can turn out to be very risky when low quality assets—selected by relatively junior bank loan officers—are pooled together and then securitized if the underlying moral hazard issues are not recognized and mitigated.

It is arguable that the kind of people who work in banking are more prone to some of these behavioural biases than the general public. In other words, there is a selection bias that attracts to the industry people who suffer from, say, overconfidence, excessive risk-taking, and, in the limit, psychopathic tendencies and behaviour. These people have no qualms about gaming the system to their advantage—however reckless their behaviour and whatever the consequences for rest of society. Such behavioural traits have always existed in this industry, and we should recognize that they are likely to be a permanent feature of the way in which the financial system operates.

The third explanation concerns systemic risk. There are parts of the banking sector that will always be prone to systemic risk, typically in the form of debt-financed speculative real estate bubbles that eventually collapse. It is virtually impossible for the sector to learn from its mistakes for a number of reasons. First, it has no collective long-term memory. The generation of bankers that had their fingers badly burned in the last crisis are not around to warn the next generation of bankers about the risks of a new round of excessive real estate lending—the sector suffers from disaster myopia. Second, they do not care. The new cohort of bright young bankers not only believe they are smarter than their predecessors, they are only interested in finding the best way to game the system in order to maximize their bonuses. When the next bubble bursts, they can always blame the regulator.

It was easy to blame the regulator for the GFC because the pro-cyclical regulatory solvency and liquidity requirements operating at the time had the perverse effect of contributing to systemic risk. What appears to be an appropriate strategy for a single bank in financial difficulty—the sale of assets to meet its liquidity ratios—becomes destabilizing when a large number of banks are in difficulty, and asset market liquidity disappears as they all try to sell assets at the same time. It is pretty obvious that this is what would happen.[106] So the regulations in place at the time of the GFC showed a poor understanding—by the regulator, in particular—of how banks will collectively behave in a crisis and hence contributed to the systemic risk.

This brings me to the fourth explanation, namely the way in which regulatory arbitrage and capture are used to circumvent regulations. These are the two most important strategies in a 'regulation game'.[107] This is an example of a CC–PP (commonize costs–privatize profits) game, better known as the game of 'privatizing profits and socializing losses'.[108] The people who work in the banking sector are far smarter and much more highly paid than those who work for the regulator. The 'game' that these smart people play is to devise ways to economize on bank capital and circumvent other regulations. They do this using deliberately overengineered solutions, typically involving complex derivatives, that regulators will not understand. In terms of regulatory capital, the aim is 'rent extraction' by stripping the system of as much capital as possible in order to maximize current bonuses.

They do this by engaging in risk-taking behaviour and, if this generates (highly leveraged) profits, they keep the profits, but if they make (highly leveraged) losses and get into difficulties, they know governments will always bail them out with taxpayers' funds. This is what is meant by the privatization of profits and the socialization of losses.[109] There

is no genuine social contract with the regulator and the rest of society—which involves a duty of care. Rather, there is a 'bankster' social contract, to use a term coined by Dowd and Buckner (2020, p. 17). This is the real moral hazard that Mervyn King mentioned above.

While regulators attempt to put in place regulations—particularly following a financial crisis—to mitigate systemic risk, they find themselves in a continuous cat-and-mouse game with industry participants who are always trying to circumvent the regulations if they believe they are too onerous, e.g., in terms of additional capital or liquidity requirements. At the same time, the regulator—and frequently, the government—is prone to being captured by the industry. The regulation game has always been played in the banking industry and always will be.

5. No Effective Measures for Ending the Great Game

I argue that there are no effective measures that any government would be prepared to introduce for dealing with the four explanations raised in the previous section, because gaming in the banking sector is virtually impossible to eliminate in practice. In the aftermath of any crisis, the sector will be suitably contrite: 'we will learn lessons from this crisis, and we will implement measures to prevent future crises—this must never be allowed to happen again'. But they do not mean it. There is one theoretical measure that might be effective and that is to make bankers personally liable for the losses they make. While this would be one important way of eliminating misaligned incentives, the probability that governments would introduce personal liability is vanishingly small.[110] I discuss this further below.

The measures that have so far been introduced to prevent another GFC will certainly prove to be insufficient in my view. They have all been along the lines of more and better information collection and regulations, together with counter-cyclical capital buffers[111] and strengthened liquidity ratios.[112] These were designed to prevent another temporary deviation from what is supposed to be the underlying 'rationality' of the financial system, under the assumption that the participants in it really want to behave in a 'rational' way, but just need the appropriate regulations to guide them—as Dick Fuld argued. However, these measures will not deal effectively with the gaming aspects discussed above, because it is questionable whether the financial system—and in particular, its key participants—behaves in a 'rational' way most of the time or that we can rely on rationality being the foundation stone upon which the financial system and its regulatory oversight can be built. This is because—to repeat the point—gaming has such a dominating influence in the financial sector.

Given this, the next question is to ask whether and how at least some aspects of gaming behaviour can be mitigated. I again look at each of the principal explanations of the GFC in turn.

5.1. Product Complexity

There have been no serious attempts to recognize the issue of product complexity by the finance industry or its regulators, let alone *deal with* it. The significance of this should not be underestimated.

5.1.1. The Continued Use of Complex Products

Despite their role in the GFC, CDOs and synthetic CDOs are still used in structured finance investing. This is because they are still regarded as effective vehicles for transferring risk, freeing up capital, and thereby helping to increase leverage.

One recent example of a complex product is open-end real estate mutual funds, which pool investors' funds to purchase commercial property. These funds come under the definition of shadow banking since they invest in long-term illiquid assets (maturity and liquidity transformation) and borrow to make additional investments (leverage).

They were badly affected by the COVID-19 pandemic, which began at the start of 2020. In March 2020, following the imposition of national lockdowns by governments around the world and concerns that there would be a significant reduction in the demand

for office space as workers started working from home, many funds were forced to suspend redemptions from investors who wanted to exit this investment category, risking loss of investor confidence and reputational damage.

A report by the European Central Bank (ECB), which conducted an analysis of these funds during the pandemic, found that:[113]

- The average redemption suspension period was 6 months.
- Suspended redemptions tended, on average, to have lower cash holdings than the average fund in their asset class. Further, investors reacted more strongly to funds' poor performance when cash holdings were low, suggesting that outflows for such funds would be larger during stress periods than funds with higher cash holdings.
- Leverage may have further amplified pressure to sell among fund managers, implying larger first-mover advantages for investors. Managers of leveraged funds reacted more pro-cyclically to changes in the prices of securities than managers of unleveraged funds. Since those sales of securities are associated with additional costs for investors remaining in the fund, leverage amplifies investors' first-mover advantages and their response to poor performance. Thus, leverage may have intensified liquidity pressures in some suspended funds, especially those with low levels of cash holdings for which selling pressures are particularly high.
- Most of the funds that suspended redemptions targeted retail investors, who are generally more prone to runs than institutional investors.
- While suspensions mitigate the immediate stress at the fund level, they can result in liquidity shortages in other financial and economic sectors. Of those investors, households accounted for the largest percentage of assets (35%), followed by insurers (26%) and investment funds (24%). By limiting investors' ability to raise cash in a period of declining market prices, the suspensions in March 2020 may have exacerbated liquidity shortages in those sectors.
- Suspensions can damage investors' confidence, trigger reputational losses, and produce spillover effects. Investors may regard a suspension as a sign of a major problem within the fund, which could lead investors to withdraw their money once the suspension has been lifted. At the same time, a suspension affecting one fund, or a small group of funds, can increase concerns about further suspensions and lead to withdrawals from other funds as well. Thus, the suspension of a fund can also have broader adverse effects on other funds, other asset classes, or the wider fund sector.
- After reopening, funds that had suspended redemptions in March 2020 experienced smaller inflows than funds that had not imposed suspensions, suggesting that reputational costs may have been incurred.
- Fund suspensions may have also affected funds that were not suspended themselves but belonged to an asset management company where other funds were suspended.

These findings reveal a poor understanding of the product by its designers—how it is impossible for a fund to invest in lumpy illiquid assets such as commercial property and maintain a liquid market in the fund's units in all market conditions. Suspending redemptions is the only way to avoid a fire sale in a period of financial stress. The designers also failed to predict the very obvious behavioural response (namely, panic) of investors at such a time. They also failed to understand the spillover effects—an example of a systemic risk—on other funds and sectors when redemptions are suspended, limiting the ability of other financial institutions and households to raise liquidity in periods of stress.

In addition, the report pointed out a failure in the system of prudential regulation. While there were regulations in place that require funds to ensure that the liquidity of assets is consistent with funds' redemption policies, the funds began the period of stress with substantial liquidity mismatches. Further, the suspensions were more likely to be seen in jurisdictions where ex ante liquidity measures—such as minimum levels of cash holdings, restrictions on the frequency of redemptions, or minimum notice periods—were not in use, highlighting not only a key weakness in the regulatory framework, but also a key weakness in product design.

The report concluded that: 'Greater availability and use of such measures could help to limit the build-up of liquidity risks in investment funds, ensuring that the liquidity of their assets is better aligned with redemption risks in periods of stress and thus reducing the likelihood of funds needing to suspend redemptions. . . . [They could also] mitigate the build-up of systemic risks'. In other words, systemic risk could be reduced by improved product design—in this case, by making use of the ex ante liquidity measures listed in the previous paragraph.

It was not as though the potential problems that open-end real estate mutual funds could face in a crisis had not been recognized before. As far back as 2006, the European Central Bank *Financial Stability Review*[114] warned that such funds 'may come under pressure when real estate prices move downwards. . . . [They] may be susceptible to financial fragility for two main reasons: (1) liquidity transformation, and (2) revaluation policies'.[115]

Yet, fourteen years on, very little has changed or, indeed, is likely to in the near future. This is confirmed by news of Ireland's new investment law—the Investment Limited Partnerships (Amendment) Act 2020—which it is claimed 'could fuel [a] real asset boom'.[116] The new investment limited partnerships (ILP) structure—which is aligned with international standards for private equity funds—is intended to make this the 'vehicle of choice' for institutional investors in private equity, private debt, renewables, and real assets. The ILPs may be open-end, limited liquidity, or closed-end, and are authorized and regulated by the Central Bank of Ireland. They can also be formed as an umbrella structure, i.e., with multiple segregated liability compartments (sub-funds), thereby enabling managers to accommodate different strategies and investor types within one overall architecture, while still preserving segregation of liability. All this increases product complexity—as well as providing an ideal opportunity for hidden leverage.

Pat Lardner, Chief Executive Officer of Irish Funds, the trade body for the international investment fund community in Ireland, said: 'The new structure will enable European pension funds to access less liquid and more specialist assets. It has the additional benefits of a common law framework and the confidence that comes with the structure being regulated and compliant with the Alternative Investment Fund Managers Directive (AIFMD) — especially relevant for trustees. It may be that ILPs underpin part of the alternatives or illiquid strategies being pursued in multi-asset and default investment choice funds. With the range of providers of investment solutions and intermediaries across the EU, they will help branded and white-labelled offerings alike. The ILP will be a strong mechanism to enable sophisticated investors such as pension funds to deploy their capital into areas such as infrastructure, social housing, healthcare, broadband and alternative energy as well as the wider transition to a greener economy and greater carbon neutrality'.

The last time there was a real assets boom in Ireland in 2007–2008—in that case, it was related to property—it led to the collapse of the Irish banking system.[117] We have yet to see whether 'sophisticated investors' have learned any lessons about investing in complex products issued by the shadow banking sector in Ireland, apart from learning how to lobby for gameable rules and then exploit them—and indeed whether the Irish financial regulator has learned anything at all.

5.1.2. The Risks Faced by End Investors as a Result of Product Complexity

Looking at the issue of product complexity from the viewpoint of the end investor, there is growing concern about the way in which investment scammers have been using advertising on online social media platforms to defraud investors.

In November 2021, the UK parliamentary Treasury Select Committee wrote to Microsoft, Twitter, Snapchat, and TikTok to enquire whether their advertising policies required firms advertising financial services on their platforms to be authorized by the Financial Conduct Authority (FCA)[118] and, if not, if they had plans to amend those policies. It also queried the firms' policies for compensating users who fell victim to online fraud due to advertising or user-generated content on their platforms and whether they had

ever enacted these policies. The committee had previously written to Facebook, Google, Amazon, and eBay with similar queries.

This is only an issue because scammers are able to seduce poorly informed retail investors into believing that it is possible to generate high risk-free returns from products with complex structures, often involving derivatives.[119] The UK Government has introduced an Online Safety Bill in an attempt to address these issues.[120]

It is clear that scammers are using product complexity and the promise of high safe returns, together with advertising that exploits the emotional weaknesses and cognitive biases of gullible investors, to lure them into parting with their money. This can only get worse going forward.

5.1.3. Possible Policy Responses to the Issue of Product Complexity

There are a number of possible new policy responses that could be considered to try and address concerns about product complexity.

First, **product liability insurance**. It is common in other areas of manufacturing for makers of products to take out product liability insurance in case someone is injured, or their property is damaged by the product. Why should there be any difference in principle with the products manufactured by the financial sector?

Second, **financial institutions would need to demonstrate that they had built strong multi-disciplinary teams of experts to design complex products**. A key component of the design would be the thorough testing of complex products under conditions of financial stress.[121] When products are stress tested, the increase in correlations within and between asset classes in a financial crisis need to be taken into account, and the implications for capital and liquidity requirements need to be identified and quantified. Related to this, aggregation issues need to be considered, since, as Dowd (2014) pointed out above, 'the risks across banks' portfolios, taken as a whole, may bear little relation to the risks of each part'. Regulators could allow firms to test out new products in the market using a 'regulatory sandbox'.[122] This would provide additional assurance to the insurer offering the liability insurance. We expect aircraft designers to test thoroughly their 'product' under conditions of stress (such as air turbulence or lightning), so why should we expect any less from financial product designers?[123]

Third, **marking-to-market through a centralized derivatives exchange**. There has to be greater security as well as transparency in the markets for complex products, especially complex derivatives products, such as CDSs. One way to achieve that is through a centralized derivatives exchange (cf., the centralized exchanges for cash market securities, such as shares and bonds). Most CDSs are still currently traded over the counter,[124] with no centralized exchange and clearing—and hence no formal marking-to-market of exposures that would prevent losses accumulating. Many existing derivative exchanges have stop-loss mechanisms and close the market when prices have fallen below a daily limit, in order to protect the integrity of the market: these features should also be considered. Another real benefit of having a centralized derivatives exchange is that it would give market participants greater information about the risk exposure of counterparty institutions, by providing valuable information on counterparty credit status. AIG provided something very similar to product liability insurance in the CDO market—and we know what happened to it in 2008. It may be that AIG could have been saved had there been a more effective system of market-to-market and stop-loss mechanisms in place.

Fourth, **reviewing and, if necessary, amending the accounting rules for complex products**. There are a couple of possibilities:

- Make it less easy to create fake profits. IFRS accounting rules appear to be particularly gameable.
- Mark-to-market accounting. As pointed out by Besar et al. (2011, para. 3.5.7): 'mark-to-market accounting cannot be easily applied to all bank exposures, and, where it is applied, it can create problems of instability of its own. When, as is often the case, bank assets are illiquid then there can be a damaging feedback loop with falling prices

> undermining balance sheets; in certain regulatory contexts, this can lead to "fire sales" of assets which further weaken market prices. . . . There is still controversy. Some in the industry believe accounting standards have been a major source of instability. Others resist proposed departures from fair value accounting, concerned that this will weaken reporting disciplines'. Clearly, more research needs to be conducted to address these issues.

Fifth, **restrictions on investments to retail customers**. There should be restrictions on the type of investments than can be sold to non-professional investors. For example, investors could be precluded from investing in products without product liability insurance or that are not marked-to-market. Further, such investments should not be marketed freely on online social media platforms: they should only be accessible to professional investors.

In my view, it is unlikely that there will be many insurers willing to offer this type of product liability insurance, not least because of the systemic risk baked into some of these complex products—as AIG discovered to its cost. Further, there has been little talk of setting up centralized derivatives exchanges with marking-to-market or seriously reviewing the accounting rules. In this case, the only way of dealing with the perverse behaviour of an industry that welcomes the complexity of products, while not fully understanding it, is to return to using **simple products** that the banks, their regulators, and their customers do understand.

In most cases, the complexity is unnecessary. We should never forget that the main functions of banks are very straightforward: to raise funds from depositors and wholesale markets in order to lend to households and businesses and to provide some other services to their customers, such as investment and risk management, foreign exchange, market making, and broking. Banks have been successfully providing many of these services for centuries.

5.2. Behaviuoral Biases in Decision Making

There have also been no serious attempts to deal with the issue of behavioural biases in decision making.

5.2.1. A State of Denial

Financial institutions and regulators need to recognize that everyone is susceptible to behavioural biases: employees in financial institutions, the managers and directors of financial institutions, and regulators themselves. So, there must be a much greater understanding of behavioural psychology, and that is particularly important when it comes to learning the lessons from history: 'This time it will be different'. It won't be! The whole financial services industry is in a state of denial about this issue.

5.2.2. Possible Policy Responses to the Issue of Behavioural Biases in Decision Making

There are a number of possible new policy responses that could be considered to try and address the concerns about behavioural biases in decision making.

First, **changing cultural norms and behaviour**. Kane (2015) accepts that there are 'hard-to-change cultural norms and assumptions that support go-for-broke risk-taking by megabanks that meets the every-day definition of theft. The problem is not to find new ways to *constrain* this behaviour, but to change the norms that support it by establishing that managers of megabanks owe duties of loyalty, competence, and care directly to *taxpayers*'.

Second, **requiring all participants in financial services (including the regulator) to develop a greater understanding of behavioural psychology** in order to help them recognize the behavioural biases that permeate the industry, such as psychopathy awareness training.

Third, **professional indemnity insurance**. Individuals involved in the design of complex products should have to take out professional indemnity insurance. Anecdotal evidence[125] suggests that professionals such as lawyers and accountants cleaned up their acts when they were required to take out professional indemnity insurance in order to conduct

business and risk losing it if they acted unprofessionally. Why should 'professionals' in the financial services industry not be treated in the same way?

However, in my view, it is even less likely that insurers would be prepared to offer professional indemnity insurance than product liability insurance to the banking sector—which tells you an awful lot.

5.3. Systemic Risk

Prior to the GFC, most financial regulation was 'micro-prudential': it was designed to reduce the chance of individual banks becoming insolvent. However, micro-prudential regulation alone will only be effective in the absence of systemic risk. If there is the danger of systemic risk, then a 'macro-prudential' system of regulation needed to be put in place—as the early studies of the GFC recommended.[126] There are two key components of macro-prudential regulation. This first involves the implementation of counter-cyclical capital requirements—by building up capital in good times so that it can be drawn down in bad times. The second ensures that banks can meet both short- and longer-term demands for liquidity as a result of maturity mismatching.

Further, as pointed out by Besar et al. (2011, para. 7.1.2), there need to be policies in place to prevent systemic network damage arising within the financial services sector and for coping with the effects of a large common shock which could trigger the widespread insolvency of financial firms. They emphasize three possible approaches:

First, it requires that regulation and governance do not exacerbate systemic disturbances, either encouraging too great a build-up of potential systemic problems or exaggerating the impact on networks of interconnections when they eventually materialize.

Second, it means ensuring that there is sufficient 'redundancy' and flexibility in the networks of interconnections between households, firms, and financial institutions to absorb shocks.

Third, it requires that traditional macroeconomic policy (both monetary and fiscal policy) is supportive, striking an appropriate balance between long-term stability and short-term support against unanticipated disturbances.

Governments around the world did actually put a huge amount of effort into attempting to deal with some aspects of systemic risk for both the regular banking sector and the shadow banking sector. I will look at these in turn.

5.3.1. Measures Put in Place for Dealing with Systemic Risk in the Regular Banking Sector

The key measure for regular banks was the Basel III international regulatory framework[127] developed by the Basel Committee on Banking Supervision,[128] to be implemented between 2017 and 2028.[129]

This introduced a capital adequacy ratio minimum requirement whereby each bank's Tier 1 and Tier 2 minimum capital adequacy ratio must be at least 10.5% of its risk-weighted assets (RWA), comprised of an 8% total capital requirement and a 2.5% capital conservation buffer. A 'global systemically important bank' (G-SIB) requires additional capital of between 1 and 2.5%.[130] The minimum capital adequacy ratio is calculated by adding Tier 1 capital to Tier 2 capital and dividing by risk-weighted assets. Tier 1 capital is the core capital of a bank. It has two components: Common Equity Tier 1 (CET1), which includes common equity and disclosed reserves (i.e., retained earnings)—a minimum of 4.5%; and Additional Tier 1 (AT1) capital, which includes noncumulative, nonredeemable preferred shares—a minimum of 1.5%. Tier 2 capital includes hybrid capital (such as convertible bonds), contingent capital (such as contingent convertible (CoCo) bonds), subordinated debt (with a minimum original term of 5 years), revaluation reserves, general loan-loss reserves, and undisclosed reserves. The purpose of Tier 1 capital is to absorb losses without requiring the bank to cease its operations, while Tier 2 capital is used to absorb losses in the event of liquidation.[131]

The capital conservation buffer recommendation is designed to build up a bank's capital, which can then be drawn down in periods of stress. In some jurisdictions, banks

have to publish 'living wills', which set out a plan for how they would systematically liquidate themselves in the event of insolvency.[132]

Basel III also introduced a counter-cyclical capital buffer in order to meet the macro-prudential goal of protecting the banking sector from the systemic risk that arises during periods of excess aggregate credit growth. 'Due to its counter-cyclical nature, the counter-cyclical capital buffer regime may also help to lean against the build-up phase of the credit cycle in the first place. In downturns, the regime should help to reduce the risk that the supply of credit will be constrained by regulatory capital requirements that could undermine the performance of the real economy and result in additional credit losses in the banking system'.[133]

The counter-cyclical capital buffer is calculated as the weighted average of the buffers in effect in the jurisdictions to which banks have a credit exposure. It consists entirely of CET1 and is implemented as an extension of the capital conservation buffer. If the minimum buffer requirements are breached, capital distribution constraints will be imposed on the bank. Consistent with the capital conservation buffer, the constraints imposed relate only to capital distributions, not the operation of the bank. At the time of writing, most jurisdictions had set a 0% (of RWA) counter-cyclical capital buffer. Exceptions were Hong Kong (1%), Luxembourg (0.5%), and Norway (1%).[134] The Bank of England said it will impose a 1% counter-cyclical capital buffer on UK banks in December 2022.

Basel III also introduced a 3% minimum 'leverage ratio', which is defined as the ratio of a 'capital measure' to an 'exposure measure'. The capital measure is Tier 1 capital. The exposure measure is the bank's average total consolidated assets, comprising on-balance sheet exposures (at their accounting values) and off-balance sheet (OBS) items (determined by multiplying the notional amount of an OBS item by the relevant credit conversion factor from the Basel II standardized approach for credit risk, subject to a floor of 10%).[135] The US Fed requires its largest banks to have a minimum leverage ratio of 6%.[136] As previously noted, the leverage factor is the inverse of the leverage ratio, so if a regulator wants to put a *cap* on the degree of leverage, it sets a *floor* on the leverage ratio. A leverage ratio of 6% implies a maximum leverage factor of approximately 17, implying that every $1 of Tier 1 capital can support a maximum of $17 of bank assets.

Basel III also recognized that liquidity requirements should be counter-cyclical, rather than operating to magnify the instability by requiring the forced sale of assets to meet liquidity ratios. Regulations should not force banks to sell assets in periods of financial stress. This was achieved via the 'liquidity coverage ratio' (LCR) and the 'net stable funding ratio' (NSFR), which are intended to mitigate short- (30-day) and longer-term liquidity mismatches, respectively. As spelled out in Basel Committee on Banking Supervision (2013), the LCR promotes the short-term resilience of a bank's liquidity risk profile, by helping to ensure that banks have an adequate stock of high-quality liquid assets (HQLAs) that can be converted easily and immediately into cash to meet liquidity needs for 30-calendar-day liquidity stress scenarios, while the NSFR supplements the LCR with a time horizon of one year. Banks should treat a 100% LCR as a minimum requirement in normal times. However, during a period of stress, banks would be expected to use their pool of liquid assets, thereby temporarily falling below the minimum requirement.

Finally, the supervisory process needed to confirm that banks' management recognized and understood the danger of systemic risk. The Bank for International Settlements (BIS) achieved this through its 2011 revision of the 'Core Principles for Effective Banking Supervision'.[137] The 2016 Senior Managers and Certification Regime (SM&CR)[138] is intended to address this in the UK.

The Basel III reforms have been implemented in stages. For example, the European Union implemented the first two stages in 2013 and 2019 through the Capital Requirements Regulation (CRR, CRR2) and the Capital Requirements Directive (CRD IV, CRD V). On 27 October 2021, the European Commission proposed CRR3 and CRD VI to complete the implementation of Basel III, but warned that the implementation date would be 2025 rather than the target date of 2023.[139] The core proposal is the 'output floor' to limit the flexibility

of banks to use their own internal models to quantify risk for the purpose of determining their individual capital requirements. The output floor is a lower limit for internal RWA calculations, such that the RWA from the internal model must be at least 72.5% of the RWA that would result from the standard model.

This proposal was criticized because it would reduce access to bank finance by companies without an external credit rating. The output floor will increase capital requirements for unrated low risk assets, and this would result in higher borrowing costs for end-customers.

European companies obtain 70% of total financing from banks. Many of these companies—in particular, small and medium-sized enterprises (SMEs)—do not receive external credit ratings, largely on account of cost: credit rating agencies charge SMEs €40,000–€50,000 for an initial evaluation, and then €30,000–€35,000 annually. According to Mack (2021), the output floor will increase capital requirements for some banks but will not lead to significantly higher borrowing costs for all unrated companies. It will predominantly affect loans to large, unrated corporates. However, increasing the rating coverage would provide banks with additional information on borrowers and this would improve their own risk management.

5.3.2. How Successful Were These Measures?

The first time that the Basel III framework was seriously tested was during the COVID-19 pandemic. A report from the Basel Committee on Banking Supervision in July 2021 on the impact of the pandemic found that:

> *the increased quality and higher levels of capital and liquidity held by banks*[140] *have helped them absorb the sizeable impact of the COVID-19 pandemic thus far, suggesting that the Basel reforms have achieved their broad objective of strengthening the resiliency of the banking system. Banks and the banking system would have faced greater stress had the Basel reforms not been adopted. Throughout the unprecedented global economic downturn, the banking system has continued to perform its fundamental functions, as banks have continued to provide credit and other critical services. While the report finds that some features of the Basel reforms, including the functioning of capital and liquidity buffers, the degree of counter-cyclicality in the framework, and the treatment of central bank reserves in the leverage ratio, may warrant further consideration, it does not seek to draw firm conclusions regarding the need for potential revisions to the reforms.*[141]

However, a report commissioned by the European Parliament[142] was more critical and found that there were important additional lessons to be learned from the pandemic:

> *First, the macro-prudential tools in the current banking regulation are clearly insufficient to deal with large macroeconomic shocks. Second, the new framework for provisioning based on expected credit losses adds an additional layer of pro-cyclicality to the one derived from the risk-sensitive bank capital regulation. Third, given the overall pro-cyclicality of the regulation, an institutional design in which micro-prudential supervision is close to the central bank is highly desirable, so that micro-prudential tools can be quickly deployed for macro-prudential purposes.*

The report concluded with the following policy recommendations:

> *First, the credit-to-GDP gap should be abandoned as the common reference point for the counter-cyclical capital buffer, because it tends to give wrong signals. Moreover, given that there is no good single indicator of systemic risk, macro-prudential authorities should use solid macro-financial analysis and sound judgement as the basis for setting the buffer. Second, banking regulation should be rebalanced in order to increase macro-prudential buffers; in particular, the upper bound of the counter-cyclical capital buffer could be raised from 2.5% to 4% and, to partially compensate this increase, the capital conservation buffer could be reduced from 2.5% to 2%. Third, it would be desirable to use a single statistical framework in the calculation of the through-the-cycle (TTC) risk measures used to compute capital requirements and the point-in-time (PIT) measures used to compute*

loan loss provisions. Finally, to mitigate the pro-cyclical effects of the new accounting standards, it would be worth considering expanding the current prudential filters that separate accounting from regulatory capital.

Dowd and Buckner (2020)—building on the work of Dowd (2017a, 2017b) cited earlier—argue that UK banks 'are more fragile now [i.e., at the start of the pandemic] than they were going into the last crisis [i.e., the GFC]. . . . The Bank of England maintains that UK banks are strongly capitalized. The evidence from banks' share prices and market values contradicts this claim'. Tables 1 and 2 show that the banks had a lower market capitalization in 2020 than in 2006 (£138.8 bn compared with £360.9 bn), and in 2020, they had an average price-to-book ratio of only 38.4%.

Table 1. The UK Big Five banks' market capitalization (£bn): End-2006 vs. May 2020.

Bank	*End-2006*	*May 2020*
Barclays	62.9	17.9
HSBC	100.5	76.5
Lloyds	16.0	19.8
RBS	166.0	12.6
Standard Chartered	15.6	12.0
Total	*360.9*	*138.8*

Notes: Based on *Financial Times* data. May 2020 figures correct as of 22 May. Source: Dowd and Buckner (2020, Table 1).

Table 2. The UK Big Five banks' price-to-book ratios: May 2020.

Bank	*Price-to-Book Ratio*
Barclays	26.1%
HSBC	49.1%
Lloyds	37.6%
RBS	28.5%
Standard Chartered	29.3%
Average	*38.4%*

Notes: Based on *Financial Times* data. Figures correct as of 22 May. The weighted average is by share of total assets. Source: Dowd and Buckner (2020, Table 4).

Dowd and Buckner (2020) conclude:

Naturally, it would be unfair to criticize the Bank for failing to anticipate the COVID-19 crisis. However, as Sir John Vickers[143] *recently stated (Vickers 2019):*

> *Failure to anticipate systemic fragility in the face of such shocks is an altogether different matter. . . . Banks' capital adequacy is a cornerstone of our economic system.*

It is reasonable to criticize the regulator for leaving the system frail when its mandate is to ensure systemic resilience. A more serious regulatory failure is difficult to imagine. The Bank of England's failure is all the more regrettable because it could have ensured that banks had built strong capital buffers at no cost to the economy.

So, while the Basel reforms were sufficient to allow the global banking system to survive a purely exogenous event, such as the COVID-19 pandemic, all these studies accept that there are still significant risks, requiring both micro-prudential and macro-prudential policy responses.

It is also important to note that, while banks could become less risky individually as a result of Basel III measures, they could still impose greater risks to the financial system as a whole. This is the conclusion of a study by Nijskens and Wagner (2011) of banks' trading of credit default swaps and issuance of collateralized loan obligations, two of the ways that banks transferred credit risk in the financial system prior to the GFC and widely recognized as a key explanation for the GFC itself, as we saw earlier. The study found that the share

price betas of banks that used these instruments increased significantly, and this was due exclusively to an increase in bank share price correlations. The study concluded that 'while banks may have shed their individual credit risk, they actually posed greater systemic risk. This creates a challenge for financial regulation, which has typically focused on individual institutions'.

Increases in correlations are a very common feature of financial crises—as demonstrated by the increase in MBS defaults during the GFC, whereas the MBS structure was supposed to diversify risks, according to the evidence given to the US Financial Crisis Inquiry Commission noted above.

Dowd (2016) is critical of capital ratios based on risk-weighted assets, but is more sympathetic to the leverage ratio:

> *At the heart of any system of capital adequacy regulation is a set of minimum required capital ratios, which were traditionally taken to be the ratios of core capital to some measure of bank assets.*
>
> *Under the international Basel capital regime, the centerpiece capital ratios involve a denominator measure known as Risk-Weighted Assets. The RWA approach gives each asset an arbitrary fixed weight between 0 percent and 100 percent, with OECD government debt given a weight of a zero. The RWA measure itself is then the sum of the individual risk-weighted assets on a bank's balance sheet.*
>
> *The incentives created by the RWA approach turned Basel into a game in which the banks loaded up on low risk-weighted assets and most of the risks they took became invisible to the Basel risk measurement system.*
>
> *. . . Long before Basel, the preferred capital ratio was core capital to total assets, with no adjustment in the denominator for any risk-weights. The inverse of this ratio, the bank leverage, . . . was regarded as the best available indicator of bank riskiness: the higher the leverage, the riskier the bank.*
>
> *. . . The introduction of a minimum leverage ratio*[144] *is one of the key principles of the Basel III international capital regime. Under this regime, there is to be a minimum required leverage ratio of 3 percent to supplement the various RWA-based capital requirements that are, unfortunately, its centerpieces.*
>
> *The banking lobby hate the leverage ratio because it is less easy to game than RWA-based or model-based capital rules. They and their Basel allies then argue that we all know that the RWA measure is flawed . . . . [because] a minimum required leverage ratio would encourage banks to load up on the riskiest assets because the leverage ratio ignores the riskiness of individual assets. . . . [However], a* high *minimum leverage ratio [which puts a* low *cap on leverage] . . . would internalize the consequences of bank risk-taking.*

Dowd (2014) is also critical of bank risk modelling (focusing on the Fed's stress test models):

> *Risk models are subject to a number of major weaknesses. They are usually based on poor assumptions and inadequate data, are vulnerable to gaming and often blind to major risks. They have difficulty handling market instability and tend to generate risk forecasts that fall as true risks build up. Most of all, they are based on the naïve belief that markets are mathematizable.*

The Fed's regulatory stress tests are subject to all these problems and more. They:

- *Ignore well-established weaknesses in risk modelling and violate the core principles of good stress testing.*
- *Are overly prescriptive and suppress innovation and diversity in bank risk management; in so doing, they expose the whole financial system to the weaknesses in the Fed's models and greatly increase systemic risk.*
- *Impose a huge and growing regulatory burden.*
- *Are undermined by political factors.*
- *Fail to address major risks identified by independent experts.*

- *Fail to embody lessons to be learned from the failures of other regulatory stress tests.*

Sheila Bair (2022), a former chair of the US Federal Deposit Insurance Corporation and founding chair of the Systemic Risk Council, argues that the Fed has repeatedly weakened its tests in recent years:[145]

> *For instance, banks no longer have to prove they can expand their balance sheets to support the economy in times of stress. They no longer have to pass one of the more rigorous tests of capital strength called the enhanced supplementary leverage ratio, or eSLR, that restricts how much they can borrow.*
>
> *The Fed has also failed to apply stress scenarios where both interest rates and consumer prices are rising in a slowing economy, conditions that exist today and may well worsen. In 2018, it did require banks to stress rising rates along with deep corrections in asset prices. Not surprisingly, those with large trading exposures such as Morgan Stanley and Goldman Sachs were most affected, and struggled to pass the eSLR. The Fed has not stress tested rising rates since 2018.*
>
> *This year, the Fed must restore the stress tests to their former rigour, and include scenarios that assume steep increases in interest rates, persistent inflation and major corrections across all markets.*
>
> *The Fed's own financial stability reports have recognized that a broad range of asset prices are vulnerable to significant declines. Stress tests should measure how falling prices could expose banks to losses directly and through their customers.*
>
> *And the Fed should follow the lead of many developed countries and require banks to have a meaningful countercyclical capital buffer, so they have excess capital available if the economy falls into trouble. This would help compensate for the many years when the Fed approved shareholder distributions that exceeded banks' earnings, depleting their capital strength.*
>
> *. . . Big banks will argue that they did well during the pandemic, so there is no need to toughen their oversight. In truth, they did well because of actions by the Fed and Congress to backstop debt markets, while providing trillions to help households and businesses.*
>
> *. . . If there is another crisis, we cannot afford to prioritize Wall Street over Main Street, as we did during the financial crisis. This time around, regulators must make sure banks can stand on their own.*

A particular feature of bank risk modelling that Dowd (2014) is especially critical of is value-at-risk, and especially the 99% VaR that 'purportedly gives us the worst loss we can expect on the best 99 days out of 100. Its purpose is to provide the risk manager with some "risk comfort" by quantifying downside risks'. He views VaR as very problematic because:

- *It tells us nothing about what we might lose on the remaining 'bad' day out of 100: the VaR gives us the cutoff to the tail but tells us nothing about what might happen in the tail itself. The VaR's tail blindness is, to say the least, an unfortunate property in risk management, where it is the tail that matters.*
- *The VaR is very gameable: traders and other risk takers are very adept at gaming VaR-based risk management by 'stuffing risk into the tail' where the model fails to detect it, exposing their banks to hidden risks that the VaR model can't pick up.*
- *The combination of VaR and Gaussianity is particularly dangerous: as we have seen, the first is blind to the tail, and the second leaves the user much more exposed than they might think. The combination of the two is reckless and violates the principle of prudence that should permeate modern risk management, but which is now notable by its almost complete absence. It is therefore especially unfortunate that the Gaussian VaR model is still the most popular risk model in use.*[146]

Kane (2018) confirms the problem: 'bankers find new and better ways to hide leverage, tail risk and distress from their supervisors; the process of rebuilding leverage-driven tail risk by means of dividends and stock buybacks is already well underway'.

5.3.3. Measures Put in Place for Dealing with Systemic Risk in the Shadow Banking Sector

The shadow banking sector has also begun to be regulated for the first time. As pointed out in an EU report entitled *Financial Supervision of Shadow Banking*,[147] the shadow banking sector requires regulation because of its size (25–30% of the total financial system), its close links to the regulated financial sector, and the systemic risks that it poses. There is also a need to prevent the shadow banking system being used for regulatory arbitrage. Regulating the regular banking system is not much good if business moves to the unregulated shadow banking sector. Even more concerning is the potential contagion through the connection of shadow banking activities to the regular banking system.

As the European Banking Authority (2015, p. 3, EBA) points out:

> *From a micro-prudential perspective, shadow banking entities are generally not subject to the same standards of prudential regulation as core regulated entities, . . . do not provide protection to investors' investments from these entities' failures, and do not have access to central banks' liquidity facilities. To the extent that shadow banking entities carry out bank-like activities, exposures to such entities may therefore be inherently risky—and thus specific limits for individual and aggregate exposures could be warranted.*
>
> *Macro-prudentially, institutions' exposures to shadow banking entities could be of concern for different reasons. Here, institutions' exposures to such entities undertaking bank-like activity may lead to regulatory arbitrage concerns, and worries that core banking activity may migrate systematically away from the regulated sector 'into the shadows'. In order to seek profits, institutions may still actively seek ways to arbitrage the rules by funding shadow banking entities. These entities, which are potentially more vulnerable to runs and/or liquidity problems, tend to be highly correlated and interconnected with the banking sector, which leads to financial stability concerns.*

The European Banking Authority (2015, pp. 6–7) then identified some specific concerns that warrant regulatory attention:

> Run risk and/or liquidity problems: *Shadow banking entities are potentially vulnerable to runs (withdrawal of deposit-like assets due to panic, early redemptions due to a confidence crisis) and/or liquidity problems (liquidation of assets at fire sale prices), stemming from credit exposures, high leverage, and liquidity and maturity mismatches between assets and liabilities. These risks are usually exacerbated because shadow banking entities do not have sectoral liquidity backstops and are generally subject to less robust and comprehensive prudential standards and supervision.*[148]
>
> Interconnectivity and spillovers: *Shadow banking entities tend to be highly correlated and interconnected with the regulated banking sector due to ownership linkages and explicit and implicit credit commitments and as direct counterparties. In times of stress, this can, directly or indirectly, generate systemic risks through contagion effects both between shadow banking entities and between such entities and the regulated banking sector, leading to a flight to quality and fire sales of assets.*
>
> Excessive leverage and pro-cyclicality: *The maturity mismatch and liquidity risks are exacerbated by shadow banking entities' ability to engage in highly leveraged or otherwise risky financial activities. Highly leveraged structures are more likely to become insolvent in the case of unexpected negative events due to inadequate loss-absorbing capacity, abrupt deleveraging and inability to roll over financing needs. The crystallization of such events can trigger a confidence crisis in the regulated banking sector, leading to severe impairment of funding sources.*
>
> Opaqueness and complexity: *The opaque and complex nature of governance and ownership structures of shadow banking entities and their relationships with the regulated banking sector constitute vulnerabilities, since, during periods of stress, investors tend to retrench and flee to safe, high-quality and liquid assets. The inherent agency problem, caused by the separation of financial intermediation activities across multiple shadow banking entities, also contributes to vulnerabilities in the financial system. Furthermore,*

there is a lack of disclosure (regarding collateral, assets or value thereof), as such entities are generally unregulated or subject to less robust prudential regulation.

In August 2013, the Financial Stability Board (FSB) published a set of policy recommendations to strengthen the oversight and regulation of the shadow banking system.[149] The FSB focused on five specific areas in which policies are needed to mitigate the potential systemic risks associated with shadow banking:

1. To mitigate the spillover effect between the regular banking system and the shadow banking system.
2. To reduce the susceptibility of money market funds (MMFs) to 'runs'.[150]
3. To assess and mitigate systemic risks posed by other shadow banking entities.
4. To assess and align the incentives associated with securitization.
5. To dampen risks and pro-cyclical incentives associated with secured financing contracts, such as repos, and securities lending that may exacerbate funding strains in times of 'runs'.

The FSB adopted four overarching principles for assessing the suitability of the regulations:

1. Principle 1: Authorities should have the ability to define the regulatory perimeter.
2. Principle 2: Authorities should collect information needed to assess the extent of risks posed by shadow banking.
3. Principle 3: Authorities should enhance disclosure by other shadow banking entities as necessary so as to help market participants understand the extent of shadow banking risks posed by such entities.
4. Principle 4: Authorities should assess their non-bank financial entities based on the economic functions and take necessary actions drawing on tools from the policy toolkit.

They FSB's policy recommendations were built on five specific principles for assessing the suitability of regulatory measures:[151]

1. Focus: Regulatory measures should be carefully designed to target the externalities and risks the shadow banking system creates.
2. Proportionality: Regulatory measures should be proportionate to the risks shadow banking poses to the financial system.
3. Forward-looking and adaptable: Regulatory measures should be forward-looking and adaptable to emerging risks.
4. Effectiveness: Regulatory measures should be designed and implemented in an effective manner, balancing the need for international consistency to address common risks and to avoid creating cross-border arbitrage opportunities against the need to take due account of differences between financial structures and systems across jurisdictions.
5. Assessment and review: Regulators should regularly assess the effectiveness of their regulatory measures after implementation and make adjustments to improve them as necessary in the light of experience.

To mitigate systemic risk, the FSB considered four basic types of regulation:

1. Regulations restricting the liquidity of deposit-like instruments (e.g., redemption fees, suspension of convertibility, etc.).
2. Regulations restricting the use of deposit-like instruments to fund long-term investments (e.g., capital requirements, restrictions on the use of client assets, and liquidity requirements, such as the laddering of the maturity of liabilities,[152] etc.).
3. Regulations reducing asymmetric information about the quality of the assets backing the deposits (e.g., extending explicit government insurance to non-bank financial institutions, restricting the types of investments that they can make, imposing coinsurance and deductibles on investors seeking credit default insurance, and regulating the activities of the credit rating agencies).

4. Regulations for dealing with systemic crises once they occur.

In light of the above criteria and following industry-wide consultations, the FSB's policy recommendations were:

1. Establishing a system-wide monitoring framework, involving enhanced data reporting and disclosure requirements, and capable of assessing sources of systemic risks in all parts of the financial system.
2. Strengthening the oversight and regulation of shadow banking in five areas:
    - 2.1. Mitigating risks in banks' interactions with shadow banking entities—to reduce the spillover of risks from the shadow banking system to the core banking system, with policy recommendations in three areas:
        - (i) Scope of consolidation—provide clarity on the boundary of consolidation to limit regulatory arbitrage opportunities.
        - (ii) Large exposures—to protect banks from the risk of the default of single private sector counterparties, including entities involved in shadow banking.
        - (iii) Banks' investments in the equity of funds, including funds engaged in shadow banking activities—the proposed capital treatment will reflect both the risk of the fund's underlying investments and its leverage.
    - 2.2. Reducing the susceptibility of money market funds to 'runs'. In order to address the systemic risks of contagious investor runs on MMFs, policy recommendations include the requirement that MMFs, which offer stable or constant net asset value (NAV) to their investors should be converted into floating NAV where workable. Where such conversion is not workable, safeguards should be functionally equivalent to the capital, liquidity, and other prudential requirements on banks that protect against runs on their deposits.
    - 2.3. Improving transparency and aligning incentives in securitization, including risk retention requirements and measures that enhance standardization of securitization products.
    - 2.4. Dampening pro-cyclicality and other financial stability risks in securities financing transactions to reduce the risks associated with the heavy dependence by the shadow banking system on this form of short-term wholesale funding.[153] Policy recommendations include standards and processes for data collection and aggregation at the global level to enhance transparency of securities financing markets; minimum standards on cash collateral reinvestment; requirements on re-hypothecation;[154] minimum regulatory standards for collateral valuation and management; and policy recommendations related to structural aspects of the securities financing markets (central clearing and changes in the bankruptcy law treatment of securities financing transactions).
    - 2.5. Assessing and mitigating systemic risks posed by other shadow banking entities and activities, using a forward-looking high-level policy framework, which consists of the following three elements:
        - (i) Assessment based on economic functions (or activities)—Authorities will identify the potential sources of shadow banking risks in non-bank financial entities in their jurisdictions from a financial stability perspective by categorizing these with reference to five economic functions, independent of the entities' legal form. They are: (1) management of collective investment vehicles with features that make them susceptible to runs; (2) loan provision that is dependent on short-term funding; (3) intermediation of market activities that is dependent on short-term funding or on secured funding of client assets; (4) facilitation of credit creation (e.g., through credit insurance); and (5) securitization-based credit intermediation and funding of financial entities.
        - (ii) Adoption of appropriate policy tools for each economic function.

(iii) Information-sharing process—Authorities will share information on which non-bank financial entities are identified as being involved in which economic function and which policy tool(s) the relevant authority adopted, in order to maintain consistency across jurisdictions in applying the policy framework.

The FSB argued that by focusing on economic functions (or activities) rather than legal forms, the framework is intended to allow authorities to capture innovations and adaptations that occur at or outside the bounds of bank regulation.

In response to the FSB's proposals, the European Banking Authority (2015) set out guidelines that lay down requirements for institutions to set limits, as part of their internal processes, on their individual exposures to shadow banking entities (primarily alleviating the micro-prudential concerns expressed above) and on their aggregate exposure to shadow banking entities (alleviating macro-prudential concerns). The guidelines were introduced on 1 January 2017.

5.3.4. Systemic Risk from Digital Currencies

There is potentially a very new source of systemic risk—and it arises from the growth of digital (or crypto) currencies, particularly those originating in the private sector. There is increasing concern that digital currencies could disrupt the functioning of financial markets and lead to financial stability risk, since they are a new payment system independent of the traditional payments system. It was the realization in September 2008 that the global payments system was on the verge of collapse that forced the world's central banks to intervene to provide unprecedented global liquidity to save the world's financial and economic systems.

Take, for example, stablecoins. These are a digital asset designed to maintain a stable value relative to the US dollar. They are currently used to facilitate trading of other digital assets but could be more widely used in the future as a means of payment by households and businesses. In November 2021, the US President's Working Group on Financial Markets released a report on stablecoins.[155] Treasury Secretary, Janet Yellen, said: 'Stablecoins that are well-designed and subject to appropriate oversight have the potential to support beneficial payments options. But the absence of appropriate oversight presents risks to users and the broader system'. The report highlighted the potential for stablecoins, when used as a means of payment, to lead to destabilizing runs, disruptions in the payment system, and the concentration of economic power.

The report recommended that Congress act promptly to enact legislation to ensure that payment stablecoins and payment stablecoin arrangements are subject to a Federal framework on a consistent and comprehensive basis. Such legislation would complement existing authorities with respect to market integrity, investor protection, and illicit finance, and would address some key concerns:

- To address risks to stablecoin users and guard against stablecoin runs, legislation should require stablecoin issuers to be insured depository institutions. The concern is that 'fire sales of reserve assets could disrupt critical funding markets. Runs could spread contagiously from one stablecoin to another, or to other types of financial institutions'.
- To address concerns about payment system risk, in addition to the requirements for stablecoin issuers, legislation should require custodial wallet providers to be subject to appropriate Federal oversight. Congress should also provide the Federal supervisor of a stablecoin issuer with the authority to require any entity that performs activities that are critical to the functioning of the stablecoin arrangement to meet appropriate risk-management standards.
- To address additional concerns about systemic risk and concentration of economic power, legislation should require stablecoin issuers to comply with activities restrictions that limit affiliation with commercial entities. Supervisors should have authority to implement standards to promote inter-operability among stablecoins. In addition,

Congress may wish to consider other standards for custodial wallet providers, such as limits on affiliation with commercial entities or on use of users' transaction data.

These issues clearly apply to digital currencies in all countries, whether issued by the private sector or the public sector. To illustrate, a report from the Economic Affairs Committee of the UK House of Lords has warned that a digital pound could lead to a run on the banks, even if it were issued by the UK central bank. Lord Forsyth, chair of the committee, said: 'The introduction of a UK central bank digital currency (CBDC) would have far-reaching consequences for households, businesses, and the monetary system. We found the potential benefits of a digital pound, as set out by the Bank of England, to be overstated or achievable through less risky alternatives. We took evidence from a variety of witnesses and none of them were able to give us a compelling reason for why the UK needed a central bank digital currency. The concept seems to present a lot of risk for very little reward. We concluded that the idea was a solution in search of a problem'.[156]

Laith Khalaf, head of investment analysis at AJ Bell, an online investment platform, said that the report will not stop the Bank of England from looking into the introduction of a CBDC, adding that if it does not create a digital pound, the private sector might: 'The best-known cryptocurrencies like Bitcoin are currently too volatile to provide a functional means of exchange, but more recently developed stablecoins, pegged to traditional currencies, could open up a new financial frontier. In theory that might wrestle some control of the UK monetary system away from the central bank, which could pose its own dangers. Not to mention the risk that other countries which introduce digital currencies could find themselves with a leg up in the technological arms race. The introduction of a digital pound could cause widespread disruption in the banking sector. If consumers were to adopt Britcoin in large numbers, that could mean a big shift of money out of deposit accounts, which are a key source of funding for commercial banks to lend into the economy. In order to persuade customers to stick with them, banks might have to increase the interest rates on offer on deposits, which would then be passed onto borrowers like mortgage holders, in order to preserve bank margins. Or they may have to end free banking, and start charging for basic services in order to make up for lost profitability'.[157]

In May 2022, stablecoins, such as Terra and Tether, fell in value by up to 50% as owners lost confidence in them—while Luna, a non-stablecoin cryptocurrency designed to support the value of Terra, fell by 96%. According to James Titcomb (2022): 'The crash has raised concerns about the very concept of stablecoins, which are designed to be a safe haven for cryptocurrency owners against the whipsawing price of digital assets such as Bitcoin. The panic has spread into more established cryptocurrencies. Bitcoin fell 10% in 24 hours to under $27,000, an 18-month low, while Ethereum saw a similar drop. Almost $200 bn has been knocked off the value of all the cryptocurrencies in circulation in the last day, according to CoinMarketCap, which tracks prices. Binance, the world's biggest cryptocurrency exchange, said it was being forced to suspend withdrawals of certain currencies'.[158]

Sam Bankman-Fried, founder of the digital asset exchange FTX, argues that Bitcoin has no future as a payments network because of its inefficiency and high environmental costs. He points out that the proof of work system of validating blockchain transactions, which underpins bitcoin, is not capable of scaling up to cope with the millions of transactions that would be needed to make the cryptocurrency an effective means of payment. There are also serious environmental concerns about the amount of energy needed to run proof of work crypto systems. Mining bitcoin consumes more energy than many countries, including Norway and Sweden, according to Cambridge University's Bitcoin Electricity Consumption Index. Some European regulators have called for a ban on the systems owing to their carbon emissions.[159]

It is clear from this that digital currencies could pose significant systemic risks both to the financial system and to the environment.

5.3.5. Possible Policy Responses to the Issue of Systemic Risk

Despite the very comprehensive analyses discussed in the previous sections and the careful identification of the systemic risks in both the regulated and shadow banking sectors, the policy recommendations and guidelines that emerged do not go far enough in my view.

The following additional policy responses could be considered.

First, **putting in place measures to ensure that there is sufficient resilience, redundancy, and flexibility in the networks of interconnections in the financial system between households, firms, and financial institutions to absorb shocks.** It is not at all clear, should a systemic risk materialize in future, whether the network will operate as a shock absorber, rather than a shock transmitter. That requires shifting more responsibility for network stability to the banks and investment institutions themselves. That, in turn, requires appropriate supervision at both the micro and macro levels.[160] It also requires new ways of analysing the financial network, e.g., as a complex adaptive system, applying techniques from the biological and natural sciences, as suggested by Besar et al. (2011, para. 4.1.19 and Appendix B.4.1.3): 'There is some hope that these new approaches may yield insights into the potential for instability in financial systems, which cannot be obtained from more conventional models of rational agents and market equilibrium'. The preponderance of agents who are intent on gaming the financial system demands that new approaches such as this are considered seriously and urgently.

Second, **putting in place measures to protect the payments system**. To prevent damage to the real economy, the payments system needs to be protected and ring fenced. To do this, various measures could be put in place, such as the separation of retail banking from investment banking—as was the case in the US between the introduction of the Glass-Steagall Act in 1933 and its repeal in 1999. This was recommended by the Vickers Final Report (Vickers 2011), which also specified certain 'mandated services'—such as the taking of deposits from, and the provision of overdrafts to, individuals and SMEs—that only retail banks can offer and certain 'prohibited services' that retail banks could not offer; examples include:

- Any service that would result in a trading book asset.
- Any service that would result in a requirement to hold regulatory capital against market risk.
- The purchase or origination of derivatives or other contracts that would result in a requirement to hold regulatory capital against counterparty credit risk.
- Services relating to secondary markets activity including the purchase of loans or securities.

Third, **putting in place a framework to ensure the banks have sufficient liquidity in times of stress**. The framework should be sufficiently flexible and the range of collateral sufficiently broad to provide liquidity insurance to solvent but liquidity-constrained banks in order to reduce the cost of disruption to the liquidity and payment services supplied by banks to the economy. To illustrate, the Bank of England introduced a number of measures[161], and additional measures were recommended in a report by Winters (2012):

- Banks are required to hold significantly higher levels of reserves or very liquid assets as a form of self-insurance against liquidity risk. This reduces but does not remove the need for central bank liquidity insurance.
- The introduction of a Discount Window Facility (DWF), in addition to central bank overnight or short-term liquidity support to banks, to address temporary liquidity issues.
- A swap facility allowing banks to swap illiquid assets (such as high-quality mortgage-backed securities) for Treasury bills for a time-limited period (e.g., three years). The facility allows banks to finance some of the illiquid assets on their balance sheets by exchanging them temporarily for more easily tradable assets, which provide more attractive collateral and hence potentially lower funding costs.[162]

- A term repo facility that allows banks to access central bank funding for a time-limited period (e.g., up to six months) against a broader range of collateral than that used in conventional open market operations (OMOs).[163]
- A term funding facility that allows banks to continue offering longer-term funding to their customers in the face of banks' inadequate provision of maturity transformation and contingent liquidity to the broader economy (e.g., through committed lines of credit).[164]
- Extending liquidity facilities to certain non-bank entities, such as central counterparties (CCPs or clearing houses),[165] which can impact financial stability and the provision of liquidity and payment services.
- 'Market-maker of last resort' (MMLR) where the central bank operates directly in asset markets when it has determined that liquidity has been sufficiently impaired as to threaten financial stability.
- An asset purchase programme (i.e., QE) that has the effect of creating substantial excess reserves in the banking system—and, whilst in operation, renders the other facilities above redundant.

The challenge, of course, is to deal with the 'moral hazard' issue, as Winters (2012) is fully aware. How do you stop banks taking imprudent risks in future when they know that their central bank will always provide this type of liquidity support?

Fourth, **reassessing Basel III capital requirements**. A number of authorities and academics have recommended this.

One example is the European Parliament-commissioned report discussed above[166], which proposed that since 'the macro-prudential tools in the current banking regulation are clearly insufficient to deal with large macroeconomic shocks . . . the credit-to-GDP gap should be abandoned as the common reference point for the counter-cyclical capital buffer . . . and the upper bound of the counter-cyclical capital buffer could be raised from 2.5% to 4% and, to partially compensate this increase, the capital conservation buffer could be reduced from 2.5% to 2%'.

In a famous letter to the *Financial Times* in 2010,[167] Professor Anat Admati from Stanford University and 19 other leading academic economists recommended that 'at least 15%, of banks' total, non-risk-weighted, assets [should be] funded by equity'.

The Vickers Final Report (Vickers 2011) proposed that 'large ring-fenced banks should be required to have an equity "ring-fence buffer" of at least 3% of RWA *above* the Basel III baseline of 7% of RWA. A ring-fenced bank is defined to be "large" if its RWA-to-UK GDP ratio is 3% or above. Smaller ring-fenced banks should have correspondingly smaller ring-fenced buffers'.

A 2015 Bank of England study[168] proposed that the appropriate level of bank capital was in the range of 10–14% of RWA, 'once resolution requirements and standards for additional loss-absorbing capacity that can be used in resolution are in place'. The study also found that 'in periods where economic risks are elevated—such as after credit booms—the appropriate level of capital would be much higher. [However, it] would be inefficient to capitalize the banking system for these elevated risk environments at all times, based on our analysis of the economic costs of higher bank capital levels. This motivates the use of time-varying macroprudential tools, such as the countercyclical capital buffer'.

Dowd (2016) was critical of capital ratios based on risk-weighted assets—since these were easy to game—but was more sympathetic to the leverage factor (the inverse of the capital ratio, i.e., core capital to total assets, with no adjustment in the denominator for any risk-weights): 'the higher the leverage, the riskier the bank . . . [A *low* cap on leverage] . . . would internalize the consequences of bank risk-taking'.

Evidence that these proposals would reduce systemic risk and by how much would need to be provided to support such changes in capital requirements.

Fifth, **removing the tax incentives that favour debt financing over equity financing** and encourage banks to borrow too much, as proposed in the Admati et al. letter. The authors argue that 'Debt and equity should at least compete on even terms'.

Sixth, **revising stress tests to meet certain principles**—in order to avoid them being used as 'regulatory camouflage' to use Haldane's (2009) term. Dowd (2014), for example, suggests the following seven principles:

1. *Stress tests should be conservative, in the sense of being based on highly adverse possible scenarios: there is no point carrying out unstressful stress tests.*
2. *There should be multiple scenarios: we wish to consider a range of plausible and heterogeneous adverse scenarios, not just one. We should then take the loss from each scenario and set the capital requirement equal to the maximum of these losses; that way, banks are covered against the losses from any of these scenarios.*[169]
3. *Stress tests should be based on simple models, not highly sophisticated ones: the evidence indicates that the simpler models work better anyway. Note also that we don't want huge armies of modellers.*
4. *The stress test models should be appropriate to the specifics of the institutions concerned: the stress tests don't make sense otherwise.*
5. *Any stress test system should be non-gameable by the parties involved.*
6. *Any system that involves a heavy regulatory burden or creates a large systemic risk exposure is destructive and counterproductive.*
7. *Any system should be transparent and accountable.*

Bair (2022) added an eighth principle, namely that, once set, the stress tests should not be weakened, as they have been in recent years in the US. She wants to 'restore the stress tests to their former rigour, and include scenarios that assume steep increases in interest rates, persistent inflation and major corrections across all markets'.[170]

Seventh, **a review of bank risk modelling**. For example, Dowd (2014) is especially critical of the combination of value-at-risk and Gaussianity, since: 'the first is blind to the tail, and the second leaves the user much more exposed than they might think. The combination of the two is reckless and violates the principle of prudence that should permeate modern risk management, but which is now notable by its almost complete absence. It is therefore especially unfortunate that the Gaussian VaR model is still the most popular risk model in use'.

Eighth, **putting in place measures to prevent banks becoming too big to fail**. There are two approaches.

The first is quantitative restrictions on the activities of certain banks. These would be similar to the ring-fencing measures proposed by the Vickers Final Report (Vickers 2011) to protect retail banks mentioned above.

The second would be some form of penalty on banks, which increases with the size of their asset base or risk exposure. It could be in one of two forms:

- A progressive increase in capital requirements. A global systemically important bank requires additional capital of between 1 and 2.5%. The Vickers Final Report (Vickers 2011) recommended additional primary loss-absorbing capacity:
    - UK G-SIBs with a 2.5% G-SIB surcharge and ring-fenced banks with a ratio of RWA to UK GDP of 3% or more should be required to have primary loss absorbing capacity equal to at least 17% of RWA.
    - UK G-SIBs with a G-SIB surcharge below 2.5%, and ring-fenced banks with a ratio of RWA to UK GDP of between 1% and 3%, should be required to have primary loss-absorbing capacity set by a sliding scale from 10.5% to 17% of RWA.[171]
- An industry-wide insurance plan with premiums that would be used to bail out banks in a future financial crisis. The Financial Services Compensation Scheme is an example of such an insurance scheme for retail investors in the UK.[172] Other examples are the US Pension Benefit Guaranty Corporation[173] and the UK Pension Protection Fund (PPF)[174], which guarantee pensions when a pension plan sponsor becomes insolvent in exchange for an industry-wide levy, which, in the case of the PPF, for example, is risk-based and depends on the sponsor's insolvency risk score.

Further, there are limits to economies of scale in banking—as with all economic activities that are not natural monopolies—so the additional capital requirements or insurance premium could, if possible, be set to be consistent with these limits.

Ninth, **no government bail-outs**. It would be very important to eliminate the expectation that governments will bail out financial institutions and the individuals who work for them if they take excessive risks.[175] So to deal with this moral hazard, the insolvency of certain financial institutions that take excessive risks must be made credible. One way to do this is for governments to pass laws that make it illegal for them to bail out certain types of financial institution, specifically those not related to the payments system.

Tenth, **reviewing the specific measures that have been proposed for dealing with systemic risks in shadow banking and considering additional measures**.

For example, the effectiveness of the Financial Stability Board's (2013) recommendations should be reviewed:[176]

1. Establishing a system-wide monitoring framework, involving enhanced data reporting and disclosure requirements, and capable of assessing sources of systemic risks in all parts of the financial system.
2. Strengthening the oversight and regulation of shadow banking in five areas:
    - 2.1. Mitigating risks in banks' interactions with shadow banking entities—to reduce spillover of risks.
    - 2.2. Reducing the susceptibility of money market funds to 'runs'.
    - 2.3. Improving transparency and aligning incentives in securitization, including risk retention requirements and measures that enhance the standardization of securitization products.
    - 2.4. Dampening pro-cyclicality and other financial stability risks in securities financing transactions to reduce the risks associated with the heavy dependence by the shadow banking system on this form of short-term wholesale funding.
    - 2.5. Assessing and mitigating systemic risks posed by other shadow banking entities and activities.

Eleventh, **putting in place measures to deal with the systemic risks from private sector digital currencies**. These could include the measures proposed by the US President's Working Group on Financial Markets report on stablecoins,[177] namely legislation to require digital currency issuers to be insured depository institutions to reduce the risk of runs, legislation to require custodial wallet providers to be regulated to address concerns about payment system risk, and legislation to require digital currency issuers to comply with activities restrictions that limit affiliations with commercial entities to address additional concerns about systemic risk and concentration of economic power.

Twelfth, **recognizing the essential role of macroeconomic stability in ensuring systemic financial stability, putting in place effective macroeconomic policies to contain unsustainable credit creation**, as proposed by, for example, Besar et al. (2011, paras 7.4.1–7.4.6). Besar et al. (2011, para 7.4.3) argue the appropriate policies need 'to achieve credit stability in which the aggregate growth and outstanding levels of private sector credit are limited to sustainable levels', but also recognize that there are 'various ways in which credit stability could be taken into account. Some argue that there needs to be additional macro-prudential policy instruments such as quantitative controls on credit expansion. Others argue that it would be sufficient to have an inflation target (or price level target) that was not so focused on consumer prices and to take greater account of the developments of monetary aggregates and of asset prices, such as real-estate prices, when setting monetary policy'. Clearly, more research is needed here.

Finally, **recognizing that increasing regulation complexity makes regulations more gameable, considering new simple approaches to the regulation of systemic risk.**

A recent example comes from Sam Woods (2022), Chief Executive Officer of the UK's Prudential Regulation Authority—which is responsible for the UK's macro-prudential regulation to prevent systemic risk and was set up in the aftermath of the GFC.[178] He has

proposed a new 'radically simpler, radically usable' approach to the financial regulation of banks.

He begins by recognizing the problems faced by the current framework and then ponders what a new framework would look like:

If banks have to preserve their capital ratios during a stress, they may do so by fire-selling assets and cutting back on lending to the real economy. In aggregate, this is the kind of behaviour that turns recessions into depressions, and it would be myopic for bank supervisors to welcome such an outcome.

So while individual macro and micro policymakers may disagree on particular issues, I think it's possible to make too much of the distinction between micro- and macro-prudential regulation. They both have the same fundamental goal: a financial system that serves the real economy, including through stresses. They aim to avoid banking crises, disorderly failures or adverse credit supply shocks that can amplify downturns and turn recessions into depressions.

It's therefore worth asking—do we really need a raft of separately calibrated 'macro' and 'micro' instruments to achieve these goals?...

I envisage each firm's capital requirement as a single number, which would be informed by both macro and micro analysis:

- *Macroeconomic cost-benefit analysis would be used to set the overall level of capital requirements in the system as a whole. That number would move up and down as systemic risks build and subside.*
- *Micro-prudential analysis of firm-specific risks would set the specific buffer for each individual firm—but the average of those buffers would need to stay within the macroeconomically optimal range.*

Building on these objectives, Woods' new proposed framework—which he calls the Bufferati—has seven components:

1. A single capital buffer, calibrated to reflect both micro-prudential and macro-prudential risks: *While the capital regime is fiendishly complex, its underlying economic goals are fairly simple: ensure that the banking sector has enough capital to absorb losses, preserve financial stability and support the economy through stresses. In developing the Bufferati, my guiding principle has been: any element of the framework that isn't actually necessary to achieve those underlying goals should be removed. The Bufferati is as simple as possible, but no simpler. With that mind, my simple framework revolves around a single, releasable buffer*[179] *of common equity. . . . The single capital buffer [is] calibrated to reflect both micro-prudential and macro-prudential risks and replac[es] the entirety of the current set of buffers.*[180] *. . . As an illustration—if you ran a macroeconomic analysis that said the average capital level should be 14%, then the supervisor might set the capital requirement for a firm with riskier exposures at 16%, while another lower-risk firm might get 12%, and so on. I think this is a pretty clean division of responsibilities, and one that reconciles macro and micro policy more effectively than giving the two authorities separate buffers to play with.*
2. A low minimum capital requirement, to maximize the size of the buffer. *I conclude that the Bufferati would benefit from a simple minimum capital requirement underneath the buffer, as a basic safety feature with which to strengthen the supervisor's hand in extreme cases. But this minimum should be set at a low level, to leave maximum space for the buffer to do its job, and breaches of it should not have automatic consequences.*
3. A 'ladder of intervention' based on judgement for firms who enter their buffer—no mechanical triggers and thresholds. *The Bufferati is replacing all thresholds, triggers and cliff-edges with a judgement-based 'ladder of intervention'. We've learnt over time that automatic thresholds for supervisory intervention come at a real cost—for example, firms will do what it takes to stay above their MDA [maximum distributable amount] trigger, including cutting lending to the real economy which rather defeats a main part of the purpose of capital regulation. In our new world, there would be no automatic consequences to dipping into the Bufferati, but, if that happened, the firm would be expected to have a plan to rebuild their capital resources.*

4. The entire buffer potentially releasable in a stress. *As regulators, we want banks to build up capital in good times, so that banks are in a strong position to deploy capital to support lending in a downturn. Releasing capital requirements in a downturn allows banks to do this more easily and readily, as it means they don't need to worry about entering buffers and triggering restrictions or other supervisory actions. Under the Bufferati, when systemic risks crystallize, the authorities could cut the system-wide average capital requirement to whatever level they deem necessary to avoid an unwarranted contraction in credit conditions and give firms room to manoeuvre as they go through the stress. A key benefit of this simpler framework is that we would be able to make very substantial cuts, far beyond the cuts to the CCyB [countercyclical capital buffer] rate that the UK's Financial Policy Committee and some other countries' macro-prudential authorities have made in recent episodes. This would have real benefits: early evidence from the COVID crisis suggests that releasing buffers is an effective way to avoid costly deleveraging by banks. This also points to the importance of building up strong buffers well in advance of the shock hitting.*
5. All requirements met with common equity. *Common equity is the quintessential loss-absorbing instrument and is easy to understand. Instruments like AT1 and 'contingent convertible' debt have their place in the current framework but they introduce complexity, uncertainty and additional 'trigger points' in a stress and so have no place in our stripped-down concept vehicle.*
6. A mix of risk-weighted and leverage-based requirements. *I don't think we can live without risk-sensitivity in capital requirements. Building a capital framework that doesn't allocate more loss absorbency to unsecured, sub-prime or otherwise riskier assets would be highly inefficient—we would probably need to run the whole system at a materially higher capital level to get comfortable with this. And such a framework would incentivize firms to take bigger risks to maximize return on equity. At the same time, risk-weights can clearly be badly wrong and excessive leverage is a danger in and of itself regardless of asset quality, and I therefore conclude that a leverage-based measure will also always be needed. I envisage that the structure of the Bufferati leverage requirement would look similar to the risk-based one: a low minimum with a single releasable buffer.*
7. Stress testing at the centre of how we set capital levels. *Last but certainly not least, stress testing would be the central analytical input that ties the regime together. Conceptually, you can see stress testing as an expression of our risk appetite: it tells you how severe a stress an optimally-capitalized banking system is expected to weather. And it puts individual portfolios under the microscope to help us identify which firms are carrying more severe risks. Our current approach to stress testing large banks in the UK revolves around a single 'annual cyclical scenario' (ACS) stress test, where we test banks' ability to keep their capital levels above a pre-set hurdle rate in a severe but plausible economic downturn. The stress test is a large exercise for ourselves and for firms, and is one of the most richly valuable pieces of the regulatory framework. Similar approaches, sometimes with a small handful of scenarios instead of just one, are in place in other jurisdictions. But in the spirit of the Bufferati, I wonder if another world is possible—one where stress tests are just as robust, but simpler to run, more frequent, and cover a much wider range of economic outcomes. We could move away from a single annual scenario in favour of thinking holistically about our risk appetite across a range of scenarios. After all, in the European insurance framework, firms run literally thousands of scenarios to test their resilience—are we so sure that one or two every year or so is the best answer for banking? One can imagine a world where we set a hundred scenarios, based on the distribution of possible shocks to the sector, and set a risk appetite across them. Rather than just pick a point on the distribution of scenarios, as we do in Europe for insurance companies, the overall level of a capital would be set by the macro-prudential assessment above—but stress testing would let us know how much of the distribution of scenarios banks can withstand. This would be a useful cross-check on the top-down macro-prudential judgement on capital levels, would identify outliers and could also be one way of allowing the authorities to adopt a higher risk appetite for smaller banks by requiring systemic banks to be robust to a wider set of scenarios. In developing this enhanced buffer framework, it is possible that a lot of*

> *the sophistication which currently resides in modelling risk-weights would move into stress testing. Indeed, this is already happening in Europe because the move to expected credit loss accounting has necessitated the development of more IRB[internal ratings-based]15-like modelling*[181] *techniques to inform the impairment provisions which feed into the stress test. Ultimately, in the spirit of simplification, one could perhaps argue that with this migration one could move the system to standardized risk-weights, and rely on stress testing to deliver the sophistication which currently comes from modelling risk-weights—but as this question is not central to the Bufferati's design I will leave it to the next generation of engineers to settle. To maintain a level playing field globally, these judgements would need to be made in a clear international framework including a macroeconomic anchor point for overall capital levels in normal times, guidance on things like what constitutes a stress, approaches to stress testing and speed of buffer rebuild, and how much loss-absorbing capacity is needed in resolution. In a nutshell, to oversee the Bufferati we would need an international framework that is clear and consistent, but also judgement-based.*

Kevin Dowd[182] thought the seven-component framework was extremely helpful in setting out the issues. He was very supportive of a single, releasable common equity buffer, but did not welcome the low minimum requirement because he believes capital requirements are already too low, the 'ladder of intervention' that gives too much regulatory discretion, the use of RWA since they can be gamed and ignore aggregation issues (Dowd 2014, 2016), and stress testing unless they satisfied the principles he set out above (Dowd 2014). So, the real question is: how gameable is the Bufferati framework?

The financial services sector may agree in principle to some of the policy responses proposed above. However, others will face obvious difficulties. For example, the sector will always be opposed to measures that involve posting more capital or paying for insurance—and will always try to circumvent them for the very reasons discussed in this paper. Similarly, a policy of no government bail-outs has the problem of making the policy credible, due to the time-inconsistency problem. As Haldane (2009) points out: 'If the ex-post failure of an institution risks destabilizing the system, any ex-ante pre-commitment by the authorities to let it fail will lack credibility'. Further, laws can be changed or ignored.

I therefore have strong doubts about how effective these measures would be, not least because of their gameability by very people who choose to join the financial services sector in the first place and subsequently end up in influential positions.

5.4. Regulatory Arbitrage and Capture

5.4.1. The Most Difficult Issue to Resolve

Regulatory gaming in the form of arbitrage or capture is the most difficult issue to resolve, especially when the government, operating through the regulator, is actively collaborating with the banks—as the examples given above in Section 3 clearly show.

5.4.2. Possible Policy Responses to the Issue of Regulatory Arbitrage and Capture

The following additional policy responses might, however, provide some mitigation.

First, **putting in place measures to reduce regulatory arbitrage.** Regulatory arbitrage is possible because regulations differ across institutions within the same jurisdiction and because they differ across jurisdictions. This provides an incentive for a heavily regulated institution to try and reclassify itself as an institution that is less heavily regulated or to operate through a less heavily regulated institution—possibly one that it has set up itself for this purpose—in its home jurisdiction or to conduct business via a less heavily regulated jurisdiction abroad.

To circumvent this, first, there needs to be a collective global agreement to have common rules in all jurisdictions—as well as an agreement to block institutions from operating through jurisdictions that fail to apply globally agreed rules. Second, domestic regulators need to be constantly vigilant about attempts by their own institutions to find new ways of circumventing the rules via both domestic and international channels. Of course, this becomes more difficult if the regulator is captured by the industry.

Second, **putting in place measures to reduce regulatory capture, whether by the industry itself or by the government**. The measures would, for example, ensure the regulator's independence and authority over both data collection and systemically risky activities, improve its institutional capabilities where needed, and increase its transparency and accountability, as proposed by Gelzinis (2019). They would also prohibit the 'revolving door' whereby personnel move between the banks and the regulator and vice versa. Government appointees to the regulator should also be prohibited.

Third, **increasing transparency**, such as requiring the value of the safety-net subsidies of banks to be reported, as recommended by Kane (2020). Kane (2018) explains why this is necessary: 'bank information systems do not try to track [the] taxpayers' stake in banking firms and the regulatory, supervisory and justice systems remain focused on disciplining banks, rather than bankers. As long as these conditions hold, *bankers* will continue to use the safety net to enrich themselves and their shareholders at our expense'.

Fourth, **introducing appropriate incentives**, such as rewarding whistle blowers for calling out examples of regulatory arbitrage and capture.

Fifth and most importantly, **making bankers personally liable for losses**.[183] One of the most effective ways of dealing with the two key issues identified by Haldane (2009)—misaligned incentives and time-inconsistency—would be to make the actions of bankers incentive compatible by ending limited liability and making bankers personally and fully liable for any costs that the taxpayer incurs in rescuing the banking system in a future financial crisis—through the posting of personal bonds.

There was an attempt to introduce a Private Member's Bill—the Financial Institutions (Reform) Bill—in the UK House of Commons in 2012, which would have made bankers personally liable. The Bill was sponsored by Steve Baker MP. According to Dowd (2012):

> *A key provision of the Bill is to make bank directors strictly liable for bank losses and require them to post personal bonds as additional bank capital. These measures reaffirm and extend unlimited personal liability for bank directors, which has long been on the statute books but proven difficult to enforce in recent years due to the (increasingly difficult) need to prove negligence. Strict liability removes the need to prove negligence and will rule out 'It wasn't my fault' excuses on the part of bank directors: if it happens on their watch, they will be liable, period.*
>
> *The Bill also calls for bonus payments to be deferred for five years, and for the bonus pool to be first in line to cover any reported bank losses. Thus, losses would be covered first out of the bonus pool and then out of directors' personal bonds before hitting shareholders.*
>
> *These measures would provide strong incentives for key decision-makers to ensure responsible risk-taking, as their own wealth would now be at risk: no longer could they expect rewards for failure.*
>
> *. . . Amongst other measures, the Baker Bill also calls for accounts to be prepared using the old UK GAAP*[184] *governed by Companies Act legislation. . . . This would put an end to the various accounting shenanigans associated with IFRS accounting standards, such as the manufacture of fake profits and the failure to disclose expected losses and promised future bonuses.*
>
> *Finally, the Bill calls for the establishment of a Financial Crimes Investigation Unit to investigate possible crimes committed by senior bankers.*

The Bill did not receive enough support in Parliament to get voted onto the statute book.

It is clear from the above that the *only* really effective measure to end gaming would be to make bankers personally liable for losses. While there has been at least one attempt to introduce a law to do this, no government has ever passed such a law. Further, no single government could introduce such a law on its own, since this would immediately cause the banking sector to move wholesale to another jurisdiction. This law would have to be introduced simultaneously in all countries—and the probability of this happening is negligible.

In short, the only really effective measure to limit gaming will not and cannot be introduced. It is a catch-22.

6. Self-Regulation and Market-Based Regulation

Some commentators are opposed in principle to government-imposed regulation, because they believe that it interferes with the free operation of the market, and they do not accept that there is sufficient evidence of 'market failure' to justify it. Such commentators instead prefer self-regulation or regulation that works with the market. I consider whether these types of regulation can deal with the issues discussed above.

6.1. Self-Regulation

Booth (2021) provides a recent case for self-regulation:

> *In the financial sphere, the common law tradition was associated with so-called 'self-regulation under the law'. A standard pattern was that the practitioners of a financial activity would form themselves into the members of a corporate body which endorsed their professional credentials, but then had authority over them. The corporate body would articulate and enforce rules of good conduct, in the understanding that breaches of those rules would be sanctioned. An extreme sanction would be expulsion from the membership. (For example, solicitors could be 'struck off' the roll of the profession maintained by the Law Society.)*
>
> *However, the members remained throughout subject also to the law of the land. If members broke the law, they might be punished as a result of charges levelled against them by the corporate body to which they belonged. Alternatively, they could be made answerable to the law by aggrieved third parties or even sometimes by the state with its police powers.*

Self-regulation was the standard in common-law countries, such as the UK, until the late Twentieth Century. The UK Financial Services Act 1986 changed self-regulation under the law into statutory regulation, and initially introduced 'self-regulatory organizations' to regulate different parts of the financial sector. However, a number of financial scandals in the 1980s and 1990s[185] put an end to a role for self-regulation in UK financial services in the 2000s.[186]

It should be clear from the gaming issues discussed above that ending self-regulation was inevitable. Further, the gaming continues to this day, as the following example at the time of writing shows. The UK Financial Conduct Authority has had to warn firms that they should not use company and insolvency law to minimize their liabilities to customers. The FCA said it had seen an increase in firms developing 'Schemes of Arrangements', particularly when it comes to redress liabilities, and that firms have requested a 'letter of non-objection' in relation to these proposals. However, the financial services regulator said it 'would be unlikely to ever issue' such a letter and states that firms should be providing the best possible outcome for customers, which would involve 'providing the maximum amount of funding possible to meet compensation claims by customers'.[187]

Given the kind of people who enter the sector, it seems very unlikely that any government would be prepared to reintroduce a system of self-regulation.

6.2. Market-Based Regulation

Llewellyn (2021) provides a recent case for market-based regulation. He proposes a social-cost benefit analysis to determine the optimal level of regulation and this would involve a trade-off between what he calls the two core objectives of bank regulation: to lower the probability of bank failures (Objective 1) and to reduce the costs of those bank failures that do occur (Objective 2). 'Given that there is a risk that the costs of regulation designed to lower the probability of bank failure rise and become disproportionate, the trade-off between Objectives 1 and 2 changes in favour of minimizing the cost of resolving failed banks. Of course, if the social costs of bank failure could be reduced to zero, the probability of failures would be of little concern, there would be no potential taxpayer

liability, no need for bail-outs, no moral hazard attached to bail-outs and indeed no need for regulation to reduce the probability of bank failures' (p. 9).

He notes that 'Historically, the focus of regulatory regimes has been on reducing the probability of failures rather than minimizing the costs of failures once they have happened' (p. 12) and points out that only since the GFC have countries introduced measures to deal with bank failures, such as the UK's 2009 Special Resolution Regime or the EU's Bank Recovery and Resolution Directive: 'The absence of clearly-defined and credible resolution arrangements was an unsustainable feature of the pre-crisis environment that needed to be corrected. The crisis showed that new structures were needed to allow banks to fail without aggravating systemic instability. In the past, a perhaps disproportionate emphasis had been given to reducing the probability of bank failures, Objective 1; in future, more attention needs to be paid to limiting the social cost of such bank failures as do occur, Objective 2. Optimal regulation for Objective 1 cannot be determined independently of the arrangements for Objective 2. A strategic (or "holistic") approach is required, to achieve the right balance between these two core objectives' (p. 12).

Yet, even when appropriately structured and targeted, Llewellyn (2021, p.14) argues that:

> *regulation . . . can never be an alternative to market discipline. After all, the biggest losers when banks go bust are their owners. Ideally, market discipline needs to be reinforced within the regime: it was the third of the three pillars in the Basel II rules and remains that in the Basel III successor. In fully developed financial systems, the monitoring of bank behaviour is not unique to specialist official agencies, even though it provides their rationale and raison d'être. Market participants have equally compelling reasons to watch what their rivals and counterparties are doing, and the discipline they impose can be as powerful as any sanctions from the regulators. Market discipline works through at least three channels—prices, quantities and awareness of triggers for official supervisory intervention. As for price, banks that take too much risk are punished by increased credit spreads on their wholesale funding and bond issuance, plus falls in their share prices and consequent rises in the cost of their equity capital. On quantity, the ability of badly-run banks to issue large amounts of paper to capital markets is, of course, compromised relative to those that are well-run, while a cash run on deposits is the harshest and most fundamental quantitative constraint imaginable on any bank's operations. Triggers come into play when capital markets are aware that central banks and regulators may take action if certain benchmarks are breached. For example, banks' market capitalizations usually fall if it is known that they have failed regulatory stress tests. There is two-way interaction here. Regulators and supervisors can and should use market signals as information sources upon which to base their own decisions, and sometimes to justify intervention.*

In short, Llewellyn argues that 'the market itself imposes pressures and incentives for good management decision-taking' (p. 12) and urges that 'regulation reinforces the positive effects of these pressures and incentives' (p. 2). However, he is also aware of the cat-and-mouse game played between the regulated and their regulators—which Kane (1988) describes as a 'regulatory dialectic'. This leads to cycles of regulatory tightening followed by liberalization: 'The tightening of regulation that followed the Great Depression of the early 1930s was followed over 40 years later by a wave of liberalization in the 1980s and 1990s, and that wave has in turn been followed by a tightening of regulation since the Great Recession of 2008 and 2009. Given these cyclical fluctuations, which admittedly can play out over generations, it has to be wondered whether a regulatory "steady state" will ever be achieved or that an optimal outcome is in sight' (p. 6).

These cycles arise, in my view, because market forces fail to work in the way Llewellyn supposes. Market forces do not deal with the gaming issues discussed above, because the industry, from the most junior bankers to the top regulators, is dominated by people involved in the game of maximizing rent extraction—there are not just a few bad apples, which the market is capable of disciplining, as Llewellyn believes. Further, market partici-

pants may well have compelling reasons to watch what their rivals and counterparties are doing—but that is so that they can copy them if they can join in the rent extraction—as the ruse described earlier by Kerr (2010) clearly showed.

Just take one example mentioned by Llewellyn, the information signals provided by price or market capitalization. As Dowd (2017a, 2017b) and Dowd and Buckner (2020) have shown—see Tables 1 and 2 above— the low market capitalization of UK banks (relative to book value) have not sent out the right signals because the Bank of England, as the UK banks' regulator, insists that these banks are well capitalized. In other words, regulators and supervisors are not using market signals as information sources upon which to base their own decisions, and sometimes to justify intervention. On the contrary, they are actively helping the industry cover up low capital ratios and underplay the significance of low price-to-book ratios—and this applies to all banks, not just a few bad apples. In addition, *all* the big banks have such low price-to-book ratios that it is meaningless to try and differentiate between well-run and badly run banks on the basis of this ratio. Further, the biggest losers when banks go bust are not their owners, but taxpayers, as the GFC has clearly shown. This is another reason why the market does not, in fact, impose the necessary pressures for good management decision-taking.

Finally, Llewellyn mentions the importance of incentives. I argue that the only effective way to achieve the regulatory steady state that Llewellyn desires is to introduce incentives that make bankers personally liable for losses.

7. Conclusions

Over the centuries, there have been very many financial crises, as the study by Reinhart and Rogoff (2013) makes clear. They all originate in the banking (including shadow banking) sector and are caused by excessive leverage and maturity mismatch, together with an asset bubble, usually related to property.

I have argued in this paper that there is a common underlying cause, namely playing the Great Game. The banking and wider financial services industry attracts a certain class of individual, one who is prone to overconfidence, excessive risk-taking, and, in some cases, psychopathic behaviour. Such people tend to like complexity for its own sake, but do not fully understand the implications of that complexity in the design of the financial products they sell, in particular, the implications for the stability of the financial system as a whole. Further, they do not care: they are only interested in gaming the system to maximize rent extraction for themselves.

Studies have shown that the measures that governments have previously introduced to prevent financial crises have only ever been marginally successful[188]—and have never achieved the regulatory steady state that some commentators desire. This is because the banking sector will always try to circumvent them for the very reasons discussed above. Further, the banking sector knows that governments will always bail out a banking system in a crisis—they cannot credibly commit not to do so. It will not be called a bail-out, of course. It will be called something innocuous, such as an asset purchase programme or quantitative easing—but it is a bail-out nonetheless. So, the 'government put' will always be there and banks will always know this—and, more importantly, know how to exercise it for their own benefit. One of the key reasons for this is regulatory capture and the active collaboration between governments and the banking sector to cover up the full extent of any banking crisis.

Unfortunately, none of the lessons from the GFC will ever be learned. Just to illustrate this, at the time of writing, there were two striking examples, both of which relate to entities that must be appropriately classified as shadow banks.

The first is Evergrande, the Chinese company that is the world's most indebted property developer. With liabilities exceeding $300 bn, it failed to meet interest payments to international investors on around $1.2 bn of international loans on 6 December 2021. This led the rating agency Fitch to declare the company in default. Evergrande had been selling assets over the preceding months to raise the money it owed to customers,

investors, and suppliers. Its shares were suspended on the Hong Kong Stock Exchange on 4 October, having fallen by more than 80% over the previous 6 months. Investors feared contagion across China's property and banking sectors.[189] China's central bank cut reserve requirements for financial institutions by 50 basis points in order to inject some liquidity into the system.[190] This demonstrates that a financial crisis can start anywhere in the world and it is not confined to the western banking system.

The second is Archegos Capital Management, which collapsed in April 2021.[191] Archegos was the $10 bn family office fund of New York investor Bill Hwang. It had a huge, highly leveraged, long position on Viacom CBS shares, which had increased in price to around $100 per share or by nearly 800% from a 2020 trough a year earlier. On the back of this price increase, Viacom CBS attempted to issue $3 bn worth of new shares to the market on 24 March. The market reacted badly, and the share price fell immediately by 23%, with a further fall of 27% on 26 March and another 7% on 29 March. The extent and suddenness of the fall in the Viacom CBS share price meant that Archegos was unable to meet a collateral (or margin) call on its long position and this resulted in a massive $20 bn fire stock sale as the banks that acted as Archegos' prime brokers—who also lent funds to Archegos to finance its long exposure to Viacom CBS—were forced to sell off the fund's assets to meet the collateral call. Collectively, the banks with exposure to Archegos made losses of $10 bn, with Credit Suisse, Nomura, Morgan Stanley, and UBS recording the biggest losses at $5.5 bn, $2.87 bn, $0.91 bn, and $0.86 bn, respectively.[192]

On 10 December 2021, the Prudential Regulation Authority sent a letter headed 'Supervisory review of global equity finance businesses' to the chief executive officers of these businesses operating in the UK. The letter specifically addressed the 'Default of Archegos Capital Management'. The review found 'weaknesses in the holistic management of risk across business units; narrow focus of onboarding arrangements[193] and inadequate re-assessment of client relationships thereafter; ineffective and inconsistent margining approaches; and an absence of comprehensive limit frameworks'. It concluded that 'Many of the deficiencies set out in this letter are not new and have been observed before.[194] In particular it is highly concerning that lessons from the Global Financial Crisis *have not been learned sufficiently*[195] and that necessary changes to business and risk management practices have not been embedded in firms' operations'.[196]

Hyman Minsky argued that the capitalist financial system is inherently unstable.[197] I argue in this paper that it is because the financial sector not only deliberately creates repeated speculative (typically property-related) bubbles via excessive leverage and maturity mismatch, it is also prone to product complexity and perverse behaviour in decision making (at all levels, including the regulator). which, in turn, lead to systemic risk and regulatory gaming.

In the meantime, the real economy suffers the collateral damage from this cat-and-mouse game being played between banks and the regulator. The banking sector's primary role is to 'oil the wheels of the economy'[198] by providing the finance to allow companies to invest and grow their businesses. Yet the regulatory changes introduced to try and stop the banks from gaming are making it more difficult for certain companies to borrow. Congdon (2021, p. 17) reports the UK experience: 'The change from Basel II to Basel III has increased the capital intensity of bank lending to corporates compared with lending to households, which is mainly for residential mortgages. Further, credit to small businesses is now increasingly problematic. That is true particularly if small businesses are new, unusual and difficult to categorize, because they cannot be fitted into the Basel III framework at all. . . . Indeed, they might in the worst case find themselves unable to access new bank credit altogether'. In the different banking markets of the EU, Mack (2021), by contrast, reports that large unrated corporates would be most badly affected. Yet the change from Basel II to Basel III has achieved nothing to reduce gaming.

It will ever be thus! The real lesson of the Global Financial Crisis is that it is bound to be repeated:[199] the Great Game will never end. We have yet to see how long it will be

before the great minds in the banking sector dream up 'shadow banking-squared' and then 'shadow banking-cubed'.

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Appendix A. Letter to the *Financial Times* on Basel III Reforms from Professor Anat Admati et al., 9 November 2010

Healthy banking system is the goal, not profitable banks[200]

Sir, Basel III bank regulation proposals that Group of 20 leaders will discuss fail to eliminate key structural flaws in the current system.

Banks' high leverage and the resulting fragility and systemic risk contributed to the near collapse of the financial system. Basel III is far from sufficient to protect the system from recurring crises. If a much larger fraction, at least 15 percent, of banks' total, non-risk-weighted, assets were funded by equity, the social benefits would be substantial. And the social costs would be minimal, if any.

Some claim that requiring more equity lowers the banks' return on equity and increases their overall funding costs. This claim reflects a basic fallacy. Using more equity changes how risk and reward are divided between equity holders and debt holders, but does not by itself affect funding costs.

Tax codes that provide advantages to debt financing over equity encourage banks to borrow too much. It is paradoxical to subsidize debt that generates systemic risk and then regulate to try to limit debt. Debt and equity should at least compete on even terms.

Proposals to impose a bank tax to pay for guarantees are problematic. High leverage encourages excessive risk taking and any guarantees exacerbate this problem. If banks use significantly more equity funding, there will be less risk-taking at the expense of creditors or governments.

Debt that converts to equity, so-called 'contingent capital', is complex to design and tricky to implement. Increasing equity requirements is simpler and more effective.

The Basel accords determine required equity levels through a system of risk weights. This system encourages 'innovations' to economize on equity, which undermine capital regulation and often add to systemic risk. The proliferation of synthetic AAA securities before the crisis is an example.

Bankers warn that increased equity requirements would restrict lending and impede growth. These warnings are misplaced. First, it is easier for better-capitalized banks, with fewer prior debt commitments hanging over them, to raise funds for new loans. Second, removing biases created by the current risk-weighting system that favour marketable securities would increase banks' incentives to fund traditional loans. Third, the recent subprime mortgage experience shows that some lending can be bad for welfare and growth. Lending decisions would be improved by higher and more appropriate equity requirements.

If handled properly, the transition to much higher equity requirements could be implemented quickly and would not have adverse effects on the economy. Temporarily restricting bank dividends is an obvious place to start.

Many bankers oppose increased equity requirements, possibly because of a vested interest in the current systems of subsidies and compensation. But the policy goal must be a healthier banking system, rather than high returns for banks' shareholders and managers, with taxpayers picking up losses and economies suffering the fall-out.

Ensuring that banks are funded with significantly more equity should be a key element of effective bank regulatory reform. Much more equity funding would permit banks to perform all their useful functions and support growth without endangering the financial system by systemic fragility. It would give banks incentives to take better account of risks they take and reduce their incentives to game the system. And it would sharply reduce the likelihood of crises.

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Notes

1 Financial derivatives that allow one counterparty to 'swap' or offset the credit risk it carries with that of another counterparty. For example, if a lender is concerned that a borrower is going to default on a loan, the lender could use a CDS to offset or swap that risk; https://www.investopedia.com/terms/c/creditdefaultswap.asp (accessed on 22 May 2022).

2 That is, take money from savers and lend it to borrowers.

3 See, e.g., Baily et al. (2008); Reinhart and Rogoff (2009); Turner (2009).

4 This term was first used to describe the geopolitical rivalry between Russia and Great Britain in Central Asia in the Nineteenth Century—which was popularized by Rudyard Kipling's 1901 novel, *Kim*. It seems highly appropriate to commandeer it for this study.

5 Securitization began in the 1970s when home mortgages were pooled by US government-sponsored enterprises (GSEs) in the Federal Home Loan Bank system, in particular, the Federal National Mortgage Association (FNMA, or Fannie Mae) and the Federal Home Loan Mortgage Corporation (FHLMC, or Freddie Mac).

6 Using borrowing in addition to own capital to buy an investment asset in expectation that the return on the asset exceeds the cost of borrowing, thereby magnifying the return on own capital. Otherwise known as investing using OPM (other people's money).

7 That is, borrowing at short-term variable interest rates to fund long-term assets, such as long-term loans to bank customers (sometimes at a fixed interest rate).

8 Dowd (2016) argues that 'pre-existing state interventions—such as deposit insurance, the lender of last resort and Too-Big-to-Fail—create incentives for banks to take excessive risks. By excessive risks, I refer to the risks that banks take but would not take if they had to bear the downsides of those risks themselves'.

9 Banks now need to be more widely defined than hitherto to include shadow banks in addition to standard regulated banks. This issue is discussed in more detail below.

10 This means it is difficult to sell for cash at short notice without suffering a significant reduction in price (i.e., during a fire sale).

11 The US banking sector and the government-sponsored enterprises were particularly to blame. They were responsible for issuing sub-prime mortgages to individuals and households that had little chance of repaying the loans. However, three pieces of US

legislation enabled this to happen: the Alternative Mortgage Transaction Parity Act of 1982, which permitted the issuance of adjustable-rate mortgages to individuals who self-certified their incomes, and the majority of sub-prime mortgages were of this type; the Housing and Community Development Act of 1992, which established the 'affordable housing' loan purchase programme for borrowers below normal lending standards, and this encouraged the issuance of sub-prime mortgages; and the 1999 repeal of the 1933 Glass-Steagall Act, which had prohibited commercial banks from undertaking investment banking operations and vice versa, leading to investment banks engaging in the sub-prime mortgage market, using significant leverage and derivatives to magnify their exposure to this market.

12 https://www.investopedia.com/terms/s/sl-crisis.asp (accessed on 22 May 2022).

13 https://www.newyorkfed.org/markets/programs-archive/large-scale-asset-purchases (accessed on 22 May 2022); https://www.ecb.europa.eu/mopo/implement/app/html/index.en.html (accessed on 22 May 2022); https://www.boj.or.jp/en/mopo/measures/mkt_ope/ope_m/index.htm (accessed on 22 May 2022); https://www.bankofengland.co.uk/monetary-policy/quantitative-easing (accessed on 22 May 2022).

14 As the UK Government did, for example, in the case of Lloyds Bank and Royal Bank of Scotland. See, e.g., Mor (2018).

15 There was an early warning of what was to come exactly a year before, and it happened with the UK. Northern Rock Bank—which had used excessive leverage and maturity mismatch to grow its UK mortgage business—faced a massive loss of confidence by its depositors when rumours circulated that it was facing difficulties renewing its short-term borrowing in the interbank market, and this led to a run on the bank by its depositors between 14 and 17 September 2007. The bank had to be nationalized by the UK Government. It was the first example of a bank run in the UK since Overend, Gurney & Company in 1866 and the City of Glasgow Bank in 1878; https://en.wikipedia.org/wiki/Nationalisation_of_Northern_Rock (accessed on 22 May 2022); https://en.wikipedia.org/wiki/Overend,_Gurney_and_Company (accessed on 22 May 2022); https://en.wikipedia.org/wiki/City_of_Glasgow_Bank (accessed on 22 May 2022).

16 In short, I examine products, people, the financial system and its regulators.

17 The term product is widely defined in the financial sector to include funds, algorithms., trading strategies, etc.

18 As an example, in late 2007 and 2008, Bank of England Governor Mervyn King refused to allow the Bank to extend long-term loans to commercial banks (Congdon 2021, p. 7). This is discussed later.

19 https://www.investopedia.com/terms/c/cdo.asp (accessed on 22 May 2022).

20 Also known as collateralized mortgage obligations (CMOs).

21 https://en.wikipedia.org/wiki/List_of_writedowns_due_to_subprime_crisis (accessed on 22 May 2022). I add a note of caution about relying on data from this source.

22 https://www.investopedia.com/terms/c/cdo.asp (accessed on 22 May 2022)

23 https://www.investopedia.com/terms/c/cdo2.asp (accessed on 22 May 2022).

24 https://www.investopedia.com/terms/c/cdo3.asp (accessed on 22 May 2022).

25 Complexity bias: Why we prefer complicated to simple; https://fs.blog/complexity-bias (accessed on 22 May 2022). The article quotes Confucius: 'Life is really simple, but we insist on making it complicated'.

26 https://www.investopedia.com/terms/a/agencyproblem.asp, (accessed on 22 May 2022).

27 https://www.investopedia.com/terms/a/asymmetricinformation.asp, (accessed on 22 May 2022).

28 See, e.g., Kodres (2013). The term 'shadow bank' was first used by economist Paul McCulley in a 2007 speech at the annual Jackson Hole financial symposium hosted by the Kansas City Federal Reserve Bank.

29 https://www.fsb.org (accessed on 22 May 2022). The FSB is an organization whose members comprise the central banks and financial regulators from the major developed economies. The FSB promotes international financial stability; it does so by coordinating national financial authorities and international standard-setting bodies as they work toward developing strong regulatory, supervisory, and other financial sector policies. It fosters a level playing field by encouraging coherent implementation of these policies across sectors and jurisdictions.

30 In short, shadow banking is the system of credit intermediation that involves organizations and activities outside the regular banking system (i.e., non-bank organizations involved in credit intermediation).

31 Claessens et al. (2012).

32 That is, a government put.

33 https://www.ifrs.org (accessed on 22 May 2022).

34 Seager-Scott (2018). See also Parker (2021).

35 Moral hazard is the 'risk that a party has not entered into a contract in good faith or has provided misleading information about its assets, liabilities, or credit capacity'; https://www.investopedia.com/terms/m/moralhazard.asp (accessed on 22 May 2022). It is also the risk that a party to a contract becomes less careful if the contract involves taking away a personal liability, such as when an insurance contract is in place and the insurance company assumes a vicarious liability. Of course, moral hazard and conflicts of interest are endemic to everything here, not just to securitization.

36 See, e.g., Herndon (2018).
37 King (2009).
38 See, e.g., Broll and Gilroy (1986).
39 See, e.g., Goddard et al. (2011).
40 Also many commercial banks.
41 https://www.verywellmind.com/what-is-groupthink-2795213 (accessed on 22 May 2022).
42 See, e.g., Blake et al. (2017).
43 Note that underperforming the peer-group is generally regarded as a much bigger reputational risk than having poor absolute performance.
44 See, e.g., Silipoab et al. (2017) and Liu et al. (2020).
45 See, e.g., Broihanne et al. (2014).
46 See, e.g., Boddy (2011).
47 See, e.g., Thompson (1999).
48 As pointed out many years ago by, e.g., Malkiel [1973] (Malkiel [1973] 2020).
49 Another was Countrywide Financial, later bought out by Bank of America; https://www.npr.org/2013/01/11/169108131/looking-back-on-bank-of-americas-countrywide-debacle (accessed on 22 May 2022).
50 Bowers (2015).
51 See, e.g., Hall et al. (2007).
52 Situational Awareness #1–The man who brought down Barings Bank; https://understandrisks.com/situational-awareness-1-the-man-who-brought-down-barings-bank (accessed on 22 May 2022).
53 Quoted in Tickell (1996).
54 See, e.g., Milgram (1963).
55 Haldane (2009).
56 See, e.g., Nickerson (1998) and Einhorn and Hogarth (1978).
57 Holding two contradictory beliefs at the same time. An example would be an investor who accepts the 'sunk cost' principle that it is irrational to continue to invest in a failing project but allows future investment decisions to be influenced by past investment decisions, because of the time and money invested in those past decisions, in clear contradiction of the 'sunk cost' principle. See Festinger (1957) and https://www.investopedia.com/terms/c/cognitive-dissonance.asp (accessed on 22 May 2022).
58 See, e.g., Dell (2006).
59 See, e.g., Snyder (1999).
60 What is blame-shifting? Escaping responsibility; https://www.thehaguepsychologist.nl/what-is-blame-shifting-escaping-responsibility (accessed on 22 May 2022).
61 Kahneman and Tversky (1979).
62 Shefrin and Statman (1985).
63 A common non-financial example of this is psychic numbing, which is defined as a 'psychological phenomenon that causes us to feel indifferent to the suffering of large numbers of people' or as Joseph Stalin put it 'One death is a tragedy; a million deaths is a statistic'; https://www.arithmeticofcompassion.org/psychic-numbing (accessed on 22 May 2022).
64 Minsky (1986).
65 It is important to understand the difference between systemic risk and systematic risk. A systematic risk is a large common shock. For example, there is a piece of bad news about the economy, which causes all the shares in the stock market to fall. Systematic risk affects the stock market every day, but the stock market—and the economy—survives. There are many cases of systemic risk that are non-financial. One famous one is the 1965 New York state electricity blackout, where a small failure in one part of the system led to the entire New York State electricity supply failing. That is an example of systemic risk not systematic risk, since there was a system-wide failure; https://en.wikipedia.org/wiki/Northeast_blackout_of_1965 (accessed on 22 May 2022).
66 See, e.g., Kashyap et al. (2008), Bisias et al. (2012), and Acharya et al. (2017).
67 Besar et al. (2011, para. 1.10).
68 This is called rollover risk, the risk that when the short-term loan comes to an end, it can only be rolled over on much more unfavourable terms or possibly not at all because lenders have completely lost confidence in the borrower.
69 Although it can be a commodity, such as gold.
70 And spread to other sectors.
71 These are discussed in the next section.
72 The 'liquidity coverage ratio' (LCR) and the 'net stable funding ratio' (NSFR) under Basel III—discussed below.

[73] This is also discussed in the next section.

[74] Insurance companies typically have substantial fixed contractual liabilities but are not exposed to short-term withdrawal of funding and are not involved in the provision of unsustainable credit expansions. They are also typically less leveraged than banks and, until the GFC, were not forced sellers of assets in adverse circumstances. Systemic problems originating in the insurance (and pension fund) industries arise only because of common exposures to asset markets or to hedging counterparties. However, weaknesses of governance and control that lead to excessive risk exposure or inappropriate asset and liability mismatch have the potential to create system-wide problems. These problems can be exacerbated by regulations that force insurers (and pension funds) to transact in illiquid markets, e.g., by requiring the forced sale of assets.

[75] https://www.investopedia.com/terms/r/regulatory-arbitrage.asp (accessed on 22 May 2022).

[76] CoCo bonds automatically convert to equity or are written off at a prespecified trigger point in the development of a financial crisis. CoCo bonds are permitted in some jurisdictions to meet national capital requirements set above the Basel III minimum. Some jurisdictions also allow CoCos to be counted as Additional Tier 1 (AT1) capital if the trigger is sufficiently low. The advantage of CoCos is that they prevent bondholders from triggering a bank insolvency; https://voxeu.org/article/why-contingent-convertible-bonds-aren-t-everyone (accessed on 22 May 2022).

[77] Kerr (2010).

[78] This is discussed further below.

[79] Noonan (2022).

[80] https://www.investopedia.com/terms/r/regulatory-capture.asp (accessed on 22 May 2022).

[81] Haldane (2009).

[82] Jorion (2006).

[83] Basel I, introduced in 1992, initially only covered credit risk, but in 1996, there was an amendment to cover market risk; https://www.bis.org/publ/bcbs24.htm (accessed on 22 May 2022).

[84] The GFC intervened, and by 2009, there were plans for Basel III.

[85] As happened to the chief risk officer at the Royal Bank of Scotland when he tried to warn the then chief executive, Sir Fred Goodwin, that the bank was taking on too much risk. See Financial Services Authority (2011). In November 2008, RBS had to be rescued by the UK Government with a capital injection of £15 bn, after the bank announced a loss of £24.1 bn, the biggest in UK corporate history; https://www.theguardian.com/business/2011/dec/12/rbs-collapse-timeline (accessed on 22 May 2022). The Financial Services Authority was the name of the UK financial regulator at the time.

[86] Time-inconsistency arises where, with the passage of time, a strategy once considered optimal is no longer perceived to be optimal and is not implemented.

[87] Carney (2014, p. 4).

[88] A key measure of capital in the Basel III framework—discussed later.

[89] https://www.investopedia.com/terms/l/libor-scandal.asp (accessed on 22 May 2022).

[90] https://www.bbc.co.uk/news/business-36737666 (accessed on 22 May 2022).

[91] https://www.bbc.co.uk/news/business-47779993 (accessed on 22 May 2022).

[92] Dixon (2012).

[93] Verity (2022).

[94] https://www.bbc.co.uk/programmes/m0014x77 (accessed on 22 May 2022).

[95] https://www.transparencytaskforce.org/previous-events-2022/the-lowball-snowball-project (accessed on 22 May 2022).

[96] https://www.cftc.gov/LawRegulation/DoddFrankAct/index.htm (accessed on 22 May 2022).

[97] In 2016, the International Monetary Fund declared that Deutsche Bank was the greatest global contributor to systemic banking risk, as a result of investing in complex derivative contracts where the risks were poorly understood; https://www.bloomberg.com/news/articles/2016-06-30/deutsche-bank-may-be-top-contributor-to-systemic-risk-imf-says (accessed on 22 May 2022). Deutsche Bank's woes over the last decade are covered in Storbeck (2022).

[98] https://www.investopedia.com/terms/e/european-sovereign-debt-crisis.asp (accessed on 22 May 2022).

[99] The Eurosystem comprises the ECB and the national central banks of those countries that have adopted the euro; https://www.ecb.europa.eu/ecb/orga/escb/html/index.en.html (accessed on 22 May 2022).

[100] There is no sovereign entity sitting above the European Central Bank or the national central banks of the EZ member states with the unlimited power to print money to bail out the EZ banking system, as there is in the case of, say, the US Federal Reserve Bank, the Bank of England, and the Bank of Japan. In other words, the ECB is not a lender of last resort, unlike a conventional central bank.

[101] The Bank Recovery and Resolution Directive was introduced in 2014 in response to the GFC to provide EU regulators with:

- Comprehensive and effective arrangements to deal with failing banks at the national level.
- Cooperation arrangements to tackle cross-border banking failures.

The directive requires banks to prepare recovery plans to overcome financial distress. It also grants national authorities powers to ensure an orderly resolution of failing banks with minimal costs for taxpayers. The directive includes rules to set up a national resolution fund that must be established by each EU country. All financial institutions have to contribute to these funds. Contributions are calculated on the basis of the institution's size and risk profile. The EU's bank resolution rules ensure that the banks' shareholders and creditors pay their share of the costs through a 'bail-in' mechanism. If that is still not sufficient, the national resolution funds set up under the BRRD can provide the resources needed to ensure that a bank can continue operating while it is being restructured; https://ec.europa.eu/info/business-economy-euro/banking-and-finance/financial-supervision-and-risk-management/managing-risks-banks-and-financial-institutions/bank-recovery-and-resolution_en (accessed on 22 May 2022).

102 Reynolds et al. (2020, pp. 59–60).

103 Steven Mnuchin was a former partner in Goldman Sachs and later worked for a number of hedge funds and also founded one, Dune Capital Management, in 2004; https://en.wikipedia.org/wiki/Steven_Mnuchin (accessed on 22 May 2022).

104 Removing its fangs or teeth.

105 Kerr (2010).

106 There are many historical examples confirming this. For example, the stock market crash on 19 October 1987 was exacerbated by a complex trading strategy called portfolio insurance. Portfolio insurance used computer algorithms to limit investor losses in a falling market (by selling stock-index futures), while enhancing gains in a rising market (by buying stock-index futures). While this was a sensible strategy at the level of the individual investor, it became destabilizing when a large number of investors have portfolio investment strategies in place that all use similar algorithms to trigger stock-index futures buy or sell instructions at the same time. In the week before the crash, the S&P 500 index fell by 9%, one of the largest weekly declines in many years, and this triggered a wave of portfolio-insurance-driven sell instructions on S&P 500 futures contracts, which caused the cash index to fall by a further 20% on 19 October. See, e.g., Gaudiano (2017).

107 See, e.g., Owen and Braeutigam (1978).

108 Hardin (1985).

109 Professor Nouriel Roubini from New York University's Stern School of Business—who predicted the GFC in an IMF position paper in 2006, earning himself the sobriquet 'Dr Doom'—was one of the first economists to recognize the GFC as a CC–PP game as early as 18 September 2008 in an article entitled 'Public losses for private gain', and he does not hold back: 'The effective nationalization of huge sectors of the economy means US taxpayers are picking up the tab for failing banks. . . . [T]hese Bush hypocrites who spewed for years the glory of unfettered Wild West laissez-faire jungle capitalism allowed the biggest debt bubble ever to fester without any control, and have caused the biggest financial crisis since the Great Depression. They are now forced to perform the biggest government intervention and nationalizations in the recent history of humanity, all for the benefit of the rich and the well connected. So Comrades Bush and Paulson and Bernanke will rightly pass to the history books as a troika of Bolsheviks who turned the USA into the USSRA [United Socialist State Republic of America]'; https://www.theguardian.com/commentisfree/2008/sep/18/marketturmoil.creditcrunch (accessed on 22 May 2022).

110 There is another theoretical measure that might be effective, and that is to adopt a much simpler banking system in the form of 100% reserve banking, in which banks only make loans in amounts and terms that match the term deposits they receive and must keep the full amount of the deposits in cash, thereby avoiding any maturity mismatching, leverage, or liquidity problems. This was the system proposed by Irving Fisher in 1935 in response to the Great Depression following the Wall Street crash of 1929 (see, e.g., Allen 1993). Amongst those hostile to it were Diamond and Dybvig (1986) who argued that '100% reserve banking is a dangerous proposal that would do substantial damage to the economy by reducing the overall amount of liquidity. Furthermore, the proposal is likely to be ineffective in increasing stability since it will be impossible to control the [shadow banking] institutions that will enter in the vacuum left when banks can no longer create liquidity'. The probability that governments would introduce 100% reserve banking is also vanishingly small.

111 The purpose of capital buffers is to enable banks to absorb losses while maintaining the provision of key services to the real economy, while automatic restrictions on distributions—via a maximum distributable amount (MDA)—prevent the imprudent depletion of capital in times of stress. In the European framework, these buffers include the capital conservation buffer (CCoB), the countercyclical capital buffer (CcyB), buffers for global and other systemically important institutions (G-SIIs and O-SIIs), and the systemic risk buffer (SyRB). The combination of all these buffers constitutes the combined buffer requirement (CBR). See Behn et al. (2022).

112 For example, Turner (2009).

113 Grill et al. (2021).

114 European Central Bank (2006, Box 6, 60–63)European Central Bank

115 The problem affects only open-end real estate mutual funds since they need to liquidate assets to meet redemptions above the level of their cash reserves. It does not typically affect closed-end real estate mutual funds, since these always trade at a market clearing price, allowing investors to sell their shares in such funds immediately, even though the share price may well be below net asset value, although it is difficult at a time of such uncertainty to accurately value the underlying assets.

116 Moss (2021).

117 See, e.g., Baudino et al. (2020).

118 The Financial Conduct Authority replaced the Financial Services Authority as one of the UK's financial regulators on 1 April 2013 following the Financial Services Act 2012.

119 While many scams involve the direct theft of investors' money by persuading them to transfer funds into non-existent investments, the issue here is different. It involves the investment in complex products that are unlikely to generate the high promised returns in practice because high disguised charges will eat up those returns; these products also tend to be very risky. In aggregate, you cannot generate higher average returns than the physical and intellectual capital stock a country allows. No amount of financial engineering can get around this fact. Yet, smart advertising suggests it is possible to do so by investing in such products.

120 Gray (2021).

121 But as a reviewer commented, the only true stress test is a real one.

122 See, e.g., the UK Financial Conduct Authority's regulatory sandbox; https://www.fca.org.uk/firms/innovation/regulatory-sandbox (accessed on 22 May 2022). However, a reviewer, while agreeing in principle, pointed out that the regulator 'is gaming these too, so that the stress is not too stressful. We see this in insurance'.

123 See, e.g., Blake et al. (2009).

124 OTC derivatives statistics at end-December 2020, BIS, https://www.bis.org/publ/otc_hy2105.htm (accessed on 22 May 2022).

125 Private communication with a lawyer who acted for insurance companies providing professional indemnity insurance when they received a claim.

126 See, e.g., Turner (2009) and Arnold et al. (2012). Others, such as Kevin Dowd, in a personal communication, dismiss macro-prudential regulation as pie in the sky since it entails being able to accurately predict the timing of the credit cycle.

127 The Basel III framework has three pillars:

- Pillar 1: Capital adequacy requirements.
- Pillar 2: Supervisory review.
- Pillar 3: Market discipline (via enhanced disclosure).

See, e.g., https://www.ibm.com/docs/en/bfmdw/8.8?topic=accord-basel-iii-summary (accessed on 22 May 2022).

128 Following the G20 meeting of November 2008.

129 Basel III: international regulatory framework for banks; https://www.bis.org/bcbs/basel3.htm (accessed on 22 May 2022).

130 At the time of writhing, there were 30 G-SIBs, including JP Morgan Chase, BNP Paribas, Citigroup, and HSBC; https://www.fsb.org/wp-content/uploads/P231121.pdf (accessed on 22 May 2022).

131 https://www.investopedia.com/terms/c/capitaladequacyratio.asp (accessed on 22 May 2022).

132 UK banks had to do this from 2021. See, e.g., Binham (2019).

133 https://www.bis.org/bcbs/ccyb/ (accessed on 22 May 2022).

134 https://www.bis.org/bcbs/ccyb/ (accessed on 22 May 2022).

135 https://www.bis.org/fsi/fsisummaries/b3_lrf.htm (accessed on 22 May 2022).

136 https://www.ibm.com/docs/en/bfmdw/8.8?topic=accord-basel-iii-summary (accessed on 22 May 2022).

137 Para 01.98 (Part 4): 'The supervisor determines that the bank's Board and senior management obtain sufficient information on, and understand, the nature and level of risk being taken by the bank and how this risk relates to adequate levels of capital and liquidity. The supervisor also determines that the Board and senior management regularly review and understand the implications and limitations (including the risk measurement uncertainties) of the risk management information that they receive'; https://www.bis.org/basel_framework/chapter/BCP/01.htm (accessed on 22 May 2022).

138 https://www.fca.org.uk/firms/senior-managers-certification-regime (accessed on 22 May 2022).

139 Fleming (2021).

140 Banks do *not* hold capital, they *issue* it. Holding capital makes it sound like an *asset*, whereas capital is a *liability* of the bank. It is a common mistake often seen even in official reports, as here.

141 Basel Committee on Banking Supervision (2021).

142 Abad and Repullo (2020).

143 Professor Sir John Vickers is Warden of All Souls College, Oxford University, and was chair of the 2010–2011 Independent Commission on Banking, which recommended fundamental reform to improve stability and competition in UK banking; https://www.asc.ox.ac.uk/person/professor-sir-john-vickers, (accessed on 22 May 2022).

144 Tier 1 capital divided by average total consolidated assets.

145 Bair (2022).

146 The Gaussian VaR model assumes that the underlying risky variables follow a normal distribution. However, the empirical evidence indicates that key variables in the financial system (such as equity and real estate returns) have a distribution with

much fatter tails than the normal. By using the normal distribution, the Gaussian VaR model will underestimate the true size of the tail risk.

147 https://ec.europa.eu/info/business-economy-euro/banking-and-finance/financial-supervision-and-risk-management/financial-supervision-shadow-banking_en (accessed on 22 May 2022).

148 A European Central Bank study found that, while investment funds faced large investor outflows as the COVID-19 shock hit, those funds with higher shares of assets eligible for central bank asset purchase programmes in their portfolio before the COVID-19 crisis, saw their performance improve by 3.7% and outflows decrease by 63% relative to otherwise similar funds. The study concludes: 'Our results suggest that central bank interventions were effective in stopping fire-sale dynamics and staving off runs on non-bank financial intermediaries, even though funds did not have direct access to the lender of last resort' (Breckenfelder et al. 2020).

149 FSB publishes Recommendations to Strengthen Oversight and Regulation of Shadow Banking, press release, 29 August 2013; https://www.fsb.org/2013/08/pr_130829a/ (accessed on 22 May 2022) and https://www.fsb.org/wp-content/uploads/r_130829c.pdf (accessed on 22 May 2022) and https://www.fsb.org/wp-content/uploads/c_130129y.pdf (accessed on 22 May 2022).

150 MMFs provide a deposit-like instrument to investors, especially when they are redeemable on short notice and at par. MMFs extend credit and are also an important provider of short-term funding for the regular banking system as well as for other non-bank chains of credit intermediation that involve maturity transformation and leverage. MMFs demonstrated their vulnerability during the GFC when a large segment of MMFs experienced contagious investor runs, necessitating large-scale support from sponsors or the official sector to maintain stability in the MMF sector. In the absence of such support, credit intermediation dependent on MMFs' funding would have been cut back dramatically.

151 Financial Stability Board (2012, p. 5)

152 That is, maturity matching the cash outflows on liabilities with the cash inflows on assets, such as bonds of appropriate term, to avoid the forced liquidation of illiquid assets to meet the liability payments.

153 Securities financing transactions, including securities lending and repurchase (repo) agreements, support price discovery and secondary market liquidity for a wide variety of securities, and are central to financial intermediaries' market-making activities as well as to their various investment and risk management strategies. However, such transactions are also used by non-banks to conduct 'bank-like' activities that entail risks from maturity and liquidity transformation, as well as leverage. These funding markets shrank dramatically during the GFC when losses materialized in the collateral underpinning these transactions, generating fire sales of assets that worsened the crisis.

154 Re-hypothecation is a practice whereby banks and brokers use assets that have been posted as collateral by their clients in an attempt to make a financial gain, such as from a short selling transaction if the assets are expected to fall in price. Clients who permit re-hypothecation of their collateral may be compensated either through a lower cost of borrowing or a rebate on fees; https://www.investopedia.com/terms/r/rehypothecation.asp

155 President's Working Group on Financial Markets (2021).

156 House of Lords Economic Affairs Committee (2022).

157 Quoted in Turton (2022).

158 Titcomb (2022).

159 Oliver (2022).

160 As Allen and Babus (2009, p. 368) argue: 'A network approach to financial systems is particularly important for assessing financial stability and can be instrumental in capturing the externalities that the risk associated with a single institution may create for the entire system. A better understanding of network externalities may facilitate the adoption of a macro-prudential framework for financial supervision. Regulations that target individual institutions, as well as take into account vulnerabilities that emerge from network interdependencies in the financial system, may prevent a local crisis from becoming global'.

161 Principally in response to the problems faced by Northern Rock Bank.

162 The Bank of England named this the Special Liquidity Scheme (SLS).

163 The Bank of England named this the Extended Collateral Term Repo (ECTR) facility. Winters (2012) proposed combining the ECTR facility with an Indexed Long-term Repo (ILTR) facility to create a regular auction facility allowing banks to access term funding against a wider collateral pool. He stressed the important role of the ECTR facility when there is a market-wide shock from an external source (e.g., acts of God (such as the COVID-19 pandemic), disintegration of the Eurozone) and recommended that the Bank should consider non-penal pricing for liquidity in response to truly exogenous shocks, as it is not in the public interest for banks to self-insure against such tail risks.

164 The Bank of England named this the Funding for Lending Scheme (FLS). Winters (2012) recommended that the Bank becomes more explicit in its role in providing a maturity transformation backstop in extraordinary situations where banks appear likely to curtail their maturity transformation provision to their customers. This would involve extending the maturity of the current facility, thereby giving banks the necessary confidence to maintain or extend the term of credit provision. However, any liquidity support should be provided on the basis that once the uncertainties have reduced, the banks are incentivized to access markets to repay the secured borrowings from the Bank.

165 This would include derivative exchanges.

166 Abad and Repullo (2020).

167 Reproduced in Appendix A.

168 Brooke et al. (2015).

169 Some (such as the authors of the 2015 Bank of England study just mentioned (Brooke et al. (2015)) might argue that this would be excessively prudent and that it 'would be inefficient to capitalize the banking system for these elevated risk environments at all times'.

170 Bair (2022).

171 The UK Government, in response to the Vickers Report, passed the Financial Services Act 2012, which required large retail banks to hold equity capital of 10% and loss absorbing capacity of 17% of RWA.

172 The Financial Services Compensation Scheme is the UK's statutory deposit insurance and investors compensation scheme for customers of authorized financial services firms. This means that FSCS can pay compensation if a firm is unable, or likely to be unable, to pay claims against it. https://www.fscs.org.uk/ (accessed on 22 May 2022).

173 https://www.pbgc.gov/ (accessed on 22 May 2022).

174 https://www.ppf.co.uk/ (accessed on 22 May 2022).

175 Mervyn King initially tried to do this in the UK at the start of the GFC, as Congdon (2021, p. 7) makes clear: 'King was antipathetic to large-scale liquidity assistance for the UK banking industry. . . . Through late 2007 and 2008, King was obdurate that the Bank of England would not extend long-term loans to commercial banks'. However, he was forced to back down by the Chancellor of the Exchequer, Alistair Darling, on 17 September 2007 following the run on Northern Rock Bank between 14 and 17 September and he ended up lending the bank £25 bn. The House of Commons Treasury Committee (2008) subsequently criticized specific actions or lack of action taken by the Bank of England in the early stages of the GFC. These were judged to have affected both the reaction to Northern Rock's problems and also contributed to liquidity stress in the broader banking system, requiring more extreme actions later to prevent a much more damaging break-down of the financial system.

176 FSB publishes Recommendations to Strengthen Oversight and Regulation of Shadow Banking, press release, 29 August 2013; https://www.fsb.org/2013/08/pr_130829a/ (accessed on 22 May 2022) and https://www.fsb.org/wp-content/uploads/r_130829c.pdf (accessed on 22 May 2022) and https://www.fsb.org/wp-content/uploads/c_130129y.pdf (accessed on 22 May 2022).

177 https://home.treasury.gov/system/files/136/StableCoinReport_Nov1_508.pdf (accessed on 22 May 2022).

178 The Prudential Regulation Authority was established on 1 April 2013 following the Financial Services Act 2012. It is formally part of the Bank of England.

179 A releasable buffer is one that is capable of being released in times of systemic stress. Following the release of a specific buffer requirement, banks can operate with lower capital ratios without breaching the combined buffer requirement (CBR) and without being subject to automatic restrictions on distributions. This should help address a key impediment to buffer usability, namely the reluctance of banks, even in a stress situation, to operate with capital ratios below the CBR. For buffers to fulfil their role as shock absorbers, it is essential that banks are willing to make use of them to absorb losses in times of stress, so that excessive deleveraging and the exacerbation of the initial downturn can be avoided, and the provision of key economic services can be maintained. See Behn et al. (2022).

180 No Pillar 2 buffers; no CCoBs, CCyBs, O-SII buffer and G-SIB buffers; no more AT1.

181 The internal ratings-based (IRB) approach to credit risk allows banks to model their own inputs for calculating risk-weighted assets from credit exposures to retail, corporate, financial institutions, and sovereign borrowers, subject to supervisory approval. Under foundation IRB, banks model only the probability of default. Under the advanced IRB approach, banks can also model their own loss given default (LGD) and exposure-at-default (EAD) levels. LGD is the absolute amount of money lost if a borrower defaults, while EAD is the amount a bank is exposed to at the time of the same default. Under the Basel III package finalized in December 2017, banks can no longer use the advanced IRB approach for exposures to financial institutions or corporates with consolidated annual revenues of more than €500 million; https://www.risk.net/definition/internal-ratings-based-irb-approach (accessed on 22 May 2022).

182 Private communication.

183 Personal liability for losses operates in some markets, e.g., the Lloyd's of London insurance market in the case of members known as Names. Since 1994, Lloyd's has allowed corporate members into the market, with limited liability; https://en.wikipedia.org/wiki/Lloyd%27s_of_London (accessed on 22 May 2022).

184 Generally Accepted Accounting Practice in the UK (UK GAAP) is the body of accounting standards published by the UK's Financial Reporting Council (FRC); https://www.icaew.com/technical/financial-reporting/uk-gaap (accessed on 22 May 2022). The primary difference between GAAP and IFRS is that GAAP is rules-based and IFRS is principles-based, resulting in IFRS guidelines providing much less overall detail than GAAP; https://www.investopedia.com/ask/answers/011315/what-difference-between-gaap-and-ifrs.asp (accessed on 22 May 2022).

185 Personal pension mis-selling, endowment mis-selling, Equitable Life (see, e.g., Blake 2001), 'split capital' investment trust mis-selling, high-risk precipice bonds, and payment protection insurance. See Dunn (2009).

186 Conaty and Deane (2008).

187 Financial Conduct Authority (2022) FCA publishes guidance consultation for firms who seek to limit their liabilities, press release, 25 January; https://www.fca.org.uk/news/press-releases/fca-publishes-guidance-consultation-firms-who-seek-limit-their-liabilities (accessed on 22 May 2022).

188 For example, Hoenig (2013) and Schoenmaker (2017).

189 Evergrande: Shares in cash-strapped China property giant plunge, *BBC News*, 14 September 2022; https://www.bbc.co.uk/news/business-58540939 (accessed on 22 May 2022). Trading of China's Evergrande shares in Hong Kong is suspended; https://www.nbcnews.com/news/world/trading-china-s-evergrande-shares-suspended-hong-kong-n1280677 (accessed on 22 May 2022). Evergrande: China property giant misses debt deadline, *BBC News*, 8 December 2021; https://www.bbc.co.uk/news/business-58579833 (accessed on 22 May 2022).

190 *Financial Times*, 7 December 2021. Shares in Evergrande resumed trading in January 2022, with the company confirming that its contracted sales fell 38.7% in 2021; *Financial Times*, 4 January 2022.

191 See McDowell (2021) and Picker and Frost (2021).

192 In April 2022, Hwang was charged with securities fraud, wire fraud, and racketeering. He was accused of unlawfully attempting to manipulate the prices of publicly traded securities in Archegos' portfolio and to defraud leading global investment banks and brokerages; https://www.fnlondon.com/articles/archegos-founder-hwang-charged-with-securities-fraud-20220427 (accessed on 22 May 2022).

193 These are the Know Your Customer (KYC) and financial crime (including money laundering) exercises before taking on a new client.

194 Including in communications such as (1) 'Observations on Risk Management Practices during the Recent Market Turbulence' (March 2008); and (2) 'Risk Management Lessons from the Global Banking Crisis of 2008′ (October 2009)', by the Senior Supervisors Group of the Financial Stability Board.

195 Emphasis added.

196 https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/letter/2021/december/supervisory-review-global-equity-finance-businesses.pdf (accessed on 22 May 2022).

197 Minsky (1986).

198 HM Treasury and Department of Business Innovation and Skills (2011, p. 3)HM Treasury and Department of Business Innovation and Skills

199 Others appear to agree, e.g., Ireland (2018).

200 https://www.ft.com/content/63fa6b9e-eb8e-11df-bbb5-00144feab49a (accessed on 22 May 2022).

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