A CYCLICAL FINANCIAL CRISIS OR A TRAGIC CONFLUENCE OF SYSTEMIC FAULTS?

(A reflection on the deeper causes of the financial crisis)

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ABSTRACT

The cited causes of the financial crisis of 2007–2009 are excessive credit growth, the bubble-like boom in asset prices and the irrationally exuberant behaviour of market players. Many believe that a combination of uncertainty and easy access to loans can be held responsible for the financial crisis. Short-term entry into financial markets and volatile exits – particularly due to the high return expected from elevated risk – are unable to generate substantial capital in the longer term. Instead, demand for financial capital is controlled by yield forecasts, which are influenced by short-term profit and loss (*Davidson*, 1999, pp. 91–92). A recurring argument in explanations of the causes of the global financial crisis is to emphasise that it was caused by subprime mortgage loans issued and traded in the United States. *We regard this notion as exaggerated and one-sided, and for this reason, we must dig deeper in the search for causes. It is this range of questions we seek to address in the present study.*

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If we look only at the formation and bursting of bubbles on the financial market, then – according to *Yeoh* (2010) – there have been approximately *nine* major financial *bubbles* since the Dutch tulip market bubble of 1636, including the dotcom bubble of the mid-1990s, as well as the latest bubble we examine here. *Shiller* (2014) writes that the expression "bubble" first became popular in Europe's stock markets at the time of the Mississippi Bubble that came to an end in 1720, in what was known as a *time of craziness*, and also best characterised as a period of *wild irrationality*. *Haldane* (2009) takes the view that the financial crisis of 2007–2009 was, as he put it, cut from familiar cloth, and that the *roll-call of excesses is familiar*, from the South Sea Bubble to the subprime mortgage crisis.

That the emergence of the bubble was not unforeseeable is borne out by two expert opinions on the matter. *Corrigan* (1987) said the following before one crisis:

> *"In recent years, the pace of change and innovation in financial markets and institutions here and around the world has increased enormously, as*

> *have the speed, volume and value of financial transactions. The period has also seen a greatly heightened degree of aggressive competition in the financial sector. All of this is taking place in the context of a legal and a regulatory framework which is increasingly outdated and ill-equipped to meet the challenges of the day. This has led to […] concern that the fragility of the system has increased in part because the degree of operational, liquidity and credit interdependency has risen sharply."*

Corrigan spoke as president of the Federal Reserve Bank of New York in January 1987, while the predicted crisis on equity markets occurred in October 1987.

According to *Shiller* (2014), "a speculative bubble is a peculiar kind of *fad* or *social epidemic* that is […] not a wild orgy of delusions but a natural consequence of the principles of social psychology coupled with imperfect news media and information channels." *In the second edition of his book* Irrational Exuberance *published in 2005, Shiller offered a definition of the term "bubble" which foreshadowed the financial crisis that was to break out shortly after:*

> *"A situation in which news of price increases spurs investor enthusiasm, which spreads by psychological contagion from person to person, in the process amplifying stories that might justify the price increases and bringing in a larger and larger class of investors, who, despite doubts about the real value of an investment, are drawn to it partly through envy of others' successes and partly through a gambler's excitement."*

Shiller's definition emphasises the character of a contagion (epidemic), the emotions of investors, and the nature of news and information media, with the *bubble* itself at the heart of the definition. In his view, *bubbles do not form due to the madness of investors*, but rather because investors act with the crowd, switching from one credible theory to another about conventional evaluation. As the global financial crisis assumed massive proportions, *Shiller* (2008b) referred to what he wrote in the work above:

> *"In 2005, in the second edition of my book* Irrational Exuberance*, I stated clearly that a catastrophic collapse of the housing and stock markets could be on its way. I wrote that 'significant further rises in these markets could lead, eventually, to even more significant declines,' and that this might 'result in a substantial increase in the rate of personal bankruptcies, which could lead to a secondary string of bankruptcies of financial institutions as well,' and said that this could result in another, possibly worldwide, recession."* (*The The New York Times*, 1 November 2008)

Also back in 2005, *Raghuram Rajan* – in a paper entitled *"Has Financial Development Made the World Riskier?"* – proved prescient in identifying the risks in the financial sector. Based on observation of the appearance and disappearance of

numerous price bubbles over more than half a century, he came to the conclusion that a bubble cannot be broken with the tools of monetary policy or other political initiatives as long as speculative fever remains. In the opinion of *Greenspan* (2007), there was little chance that the world's central banks would be able to calm the latest wave of human euphoria, which reminded him of the 17th-century Dutch tulip craze or the South Sea Bubble of the 18th century *("The Roots of the Mortgage Crisis." The The Wall Street Journal*, 12 December 2007, p. A19).

Once the crisis had abated, observers started to examine not only the similarities but also the differences in comparison to past crises. The latest developments in communication technology and the growing importance of the institutional investor environment can indeed be regarded as new features.[1]

Witnessing the gravity of the financial crisis, *David Brooks* wondered "how so many people could be so stupid, incompetent and self-destructive all at once" (*The The New York Times*, 15 January 2009). To this incredulous question, *Rappaport* (2012) provides an answer when he declares that the reality is exactly the opposite. In his view, company and investment managers who were responsible for other people's money were neither stupid nor self-destructive but were merely individuals acting in their interests under the conditions of a market economy, which represented a *system of incentives* that propelled their destructive economic behaviour. *Rappaport* believes the fundamental problem is that corporate and investment communities have neglected to adapt their own business practices to an economy dominated by professional managers who are *responsible for other people's money.*

Regarding the destructive effects of the crisis, *Raghuram Rajan* likewise sought the deeper causes of the crisis in wrong incentives:

> *"What enveloped all of us was not some sort of collective hysteria or mania. Some what frighteningly, each one of us did what was sensible given the incentives we faced. Despite mounting evidence that things were going wrong, all of us clung to the hope that things would work out fine, for our interests lay in that outcome. Collectively, however, our actions took the world's economy to the brink of disaster, and they could do so again unless we recognize what went wrong and take the steps needed to correct it."* (*Rajan*, 2012)

1 The latest crisis we examine here differed from the "dot-com bubble" of the mid-1990s in a number of respects. Firstly, the "dot-com boom" was based on the introduction of a broadly used technology which impacted the economy as a whole. Similar cycles of boom to bust could be observed in earlier times with the introduction of sewage channels, the railways, the automobile and computers. Secondly, credit debt played a critical role in the crisis of 2007–2009, but it had no role in the dot-com fiasco. Finally, real estate assets played a key role in the later crisis, given their significant weight in consumers' financial balance sheets. Consequently, when the value of property plunged sharply, this had a very serious impact on indebted homeowners. In contrast, despite a 75% decline in the stock market index, the bursting of the dot-com bubble did not lead to a financial crisis. (A detailed discussion of the differences is found in Rappaport (2012).)

> The opinions quoted here suggest that incentives were neither the root nor the cause of the financial crisis and its grave abuses, and yet can still be regarded as an important contributory factor.[2]

All the above arguments are less likely to lead to the supposition that the financial crisis examined here should be treated as a *cyclical crisis*, and rather more likely to the suspicion that a very detrimental combination of *faults in the financial system* lay behind the crisis. As a result of changes in recent decades, the brokering conflicts of the capitalised market economy have transferred from the realm of companies and product markets to investment management firms and financial markets. With movements of savings by investment institutions, a new level of brokers has been incorporated into the system, and for this reason, *the distance between investors and their money has further increased*. The most severe consequence of this has been that dominant corporate shareholders and institutional investors are no longer clients, but have *become agents of investment managers*. Today conflicts may arise between company managers and the managers of institutional savings, despite the fact that investment managers are supposed to be acting in the interests of the latter.

RADICAL TRANSFORMATION OF THE FINANCIAL SYSTEM AND PRODUCT STRUCTURE

In the wake of deregulation of financial markets, the involvement of banks in the bond market and the formation of universal banking conditions, a new institutional structure is coming into being in which financial institutions follow the "originate to distribute" model, which presupposes the "repackaging" of assets for sale. In this case, *the risks are passed on to clients and partners*, and greater profit is generated than would be possible under simple "commitment" models. *Minsky* (1988) observes that this practice keeps higher profitability to the fore through financing on the financial market, contrary to the bank-based financing of projects. With the ascendance of the "originate to distribute" strategy, *risk has transformed into a commodity.* As such, risks can be bunched together, carved up and expressed in money, then repackaged for the next sale. Debt has become *structured* in financial jargon, and securitization has become the means of achieving this.

Sen (2011) notes that securitization and the use of securities-based assets are indicative of the changing nature of money. The process presupposes that there is

2 Prior to the crisis that began in 2007, highly regarded business leaders, professional investors and scholars *(Warren Buffett, Nouriel Roubini, Robert J. Shiller)* issued widely published warnings that a toxic combination of the rapidly swelling housing bubble and increasingly leveraged financial institutions might lead to an economic catastrophe. We cannot ignore the active group of those carrying out unsecured sales, who bet billions of dollars on the potential mass failure of those taking out mortgage loans.

no limit to the creation of debt on the part of banks since bank lending has no attached liabilities, and because credit does not tie down significant funds (in the form of bank reserves). At the same time, this significantly *reduces the central bank's strength* in credit protection. In the system of structured financial products, banks do not have to assume risk and are instead able to evaluate products as common bonds, packaging and selling them by exploiting them as (specially earmarked) assets off the balance sheet. Even failures have not deterred them from applying off-balance processes.

The mass of derivative financial products included collateralized debt obligations (CDOs), being securities backed by securitized assets (bonds or debt), as well as asset-backed securities (ABS) and credit default swaps (CDS). The options for securitisation of mortgaged assets created new investment channels for mortgage brokerage firms, issuers and insurers of asset-backed securities, investment banks, and numerous other financial institutions which purchased and "repackaged" these securities. Each of these was able to take out loans by acquiring such assets on these same assets which no longer fell under the monetary control of the central bank. Credit movements like this made it easier for the asset-backed securities created by underlying (or original) assets to be "shifted across," while providing support to numerous partners who gained possession of these assets.[3]

Innumerable *derivative instruments* (futures, swaps, options, etc.) have appeared in deregulated financial markets, the goal of which is to protect the value of assets in uncertain markets. Financial instruments like these have made it much simpler to invest in and acquire assets than would otherwise have been possible. Financialization has opened up vast potential for the "explosion" of financial markets. The transactions above could be sustained in the financial sector for as long as the instruments used for hedging, in a position of uncertainty, worked to reduce and compensate for risks. In this regard, *Sen* (2011) makes a point of emphasising that "risk-adjusted returns/losses on assets with long (buy) positions (of assets) had to be more than covered by the losses/returns on short (sell) positions on assets."

The rise and fall of collateralized debt obligations (CDOs) serve as an excellent example of the initially profitable, but later seriously loss-generating nature of this derivative financial product. Commercial banks and investors looked on mortgage loans as an opportunity for good returns, and for this reason, investment banks wanted to purchase mortgage loans from those offering them. Investment banks borrowed an enormous amount and then purchased mortgage loans by the thousands. These financial institutions had access to a constant influx of money through repayments on mortgage loans by homeowners. The investment banks

3 Credit movements similar to those mentioned, through non-banking channels of the derivatives markets, were almost uncontrollable. This system is described by Nersisyan and Wray (2011) as a "shadow banking system."

subsequently *packaged the mortgage loans together, then sliced up the package*: the *top* slice was made up of secure mortgage loans; the *middle* slice those carrying average risk; and the *lower* slice those with a high risk, entailing the risk of default. The investment banks then repackaged the slices and called them collateralized debt obligations (CDOs). *Payne* (2013) cautions that the growth in mortgage lending in the subprime loan category *did not originate from banks, but rather from mortgage credit issuers not qualifying as banks*, from enterprises not registered as banks. These non-banking institutions were private lenders and financial enterprises that targeted the home mortgage loan business, and, given that their operations fell outside normal banking processes, usually appeared to households to be the sources of mortgage loans themselves, and not receivers of bank financing.

For as long as homeowners repaid their mortgage loans in time, participants in the game – lenders, assessors and valuers, credit rating agencies, and stock market investment banks interested in mortgage-backed securities – continued to prosper. No one worried about homeowners defaulting on the loans because, as soon as they possibly could, every institution *sold on the mortgage loans to the next institution* – for which the loans then became their problem – and made profits from such transactions in the millions of dollars. However, *Payne* (2013) stresses that this process created a "time bomb" which could have exploded at any minute. The market's excessive trust in the new CDO products created an adverse situation, only exacerbated by the *speculative boom* affecting property, as household debts everywhere began to reach unsustainably high levels.

It caused a major surprise when less responsible homeowners began to default on their mortgages, which were then already held by banks and other investors in the form of CDOs. Initially, this did not appear to be a problem since the banks were able to put homes up for sale. However, the banks were reinvesting an increasing amount of monthly loan repayments in residential real estate. They were offering so many properties for sale that a market was created in which supply was greater than demand as a consequence so that house prices not only stopped rising but began to plunge sharply.[4] Given that home prices continued to plummet, this meant that investment banks were holding worthless housing portfolios. These institutions attempted to sell the CDO packages they held, but by this time investors were obviously no longer interested in buying them. They knew that the *flow of money* from the upper and middle slices of divided packages *was not trickling*

4 According to Payne's illustration (2013), this led to an interesting problem for all the large number of homeowners who were still repaying their mortgage loans. When all the homes in their neighbourhood were put up for sale after foreclosure, the value of their homes would only decrease, leaving them to wonder: "Why should we repay our 250,000-dollar mortgage loan when the house is now only worth 75,000 dollars?" Despite the option of repaying still being open, a large number of homeowners decided there was no sense in continuing repayments on their mortgage loans and abandoned their homes, leaving them to the banks.

downwards. This fact was a major problem for investment banks because they had previously *borrowed* millions of dollars, and sometimes even invested billions of dollars in these transactions. Investors had by then purchased millions of CDO products which eventually became worthless. Issuers of mortgage loans proved unable to sell these loans to banks.

The examination into the causes of the financial crisis (*The Turner Review*, 2009) indicated that the overwhelming majority of accumulated losses were to be found not in the books of end-investors, where the maturity of assets could be tracked, but rather on the books of over-leveraged banks and bank-like institutions. The impact was not only seen in the growth of household debts but was similarly apparent at massively over-leveraged financial institutions, which purchased the newly developed financial instruments on credit, then sold these on to other institutions, which likewise bought them from loans. The size of the financial sector significantly increased, and so did the indebtedness of financial institutions. It was proven that the use of leverage (i.e. increasing the weight of loan capital), although potentially multiplying profits, at the same time increases financial risk. This risk remains uncovered when asset bubbles burst, leaving banks with insufficient capital and a shortage of liquidity.

THE DESTRUCTIVE EFFECTS OF SHORT-TERMISM

It is widely known that the choice of assets available to investors ranges from liquid (cash and short-term financial instruments) to physical assets (including real estate). Whenever this asset structure is available, investors *may see it as more favourable to switch from long-term to short-term financial instruments*. Similarly to *Keynes*' liquidity trap, situations of this nature may strengthen the tendency towards short-term investment.

According to *Rappaport* (2012), short-termism can be seen as a factor that contributed to the global financial crisis. The world of finance is increasingly dominated by professional managers who are *responsible for other people's money*. The financial crisis examined here followed a period of uncontrollable euphoria. Market agents entrusted to handle other people's money played a defining role in the evolution of the crisis, operating in subjugation to incentives that became the source of the destructive effects of short-termism.

The main problem is the practice whereby managers tend more to be *rewarded for short-term performance* rather than for creating value in the longer term. If individuals must shoulder the consequences of their decisions, then this practice raises ethical concerns. Experience has long shown that whatever contributes to good performance in the short term may increase risk and lead to a weak perfor-

mance in the long run. If the long-term interests of shareholders are ignored, then this creates a *value gap*, which is the difference between the *current equity market price* and the *potential value* if the company is operated with the goal of maximising shareholder value.

Short-termism can have detrimental consequences for value even when the condition of the economy is relatively stable. As *Rappaport* (2012) also stresses, it is precisely short-term behaviour which institutions responsible for other people's money conceal from the latter. No management group would admit that it *turned down value-generating investment opportunities* to be able to fulfil short-term profit goals. The dangerous consequences of risky short-termist behaviour have become apparent after the collapse of company share prices, although the short-termist behaviour is not necessarily linked to asset bubbles. The main reason companies took on excessive risk was the combination of short-term instruments. These incentives did not merely reward managers for generating quarterly profits and short-term share price growth, but also served as a measure of performance for internal evaluation.[5] Under such circumstances, the company's long-term prosperity cannot be the goal of upper management when they receive a substantial reward for short-term performance based on their incentives even when this performance endangers the company's long-term viability.

Short-termist behaviour in investment and business management can easily lead to an erosion of trust. *Rappaport* (2012) warns that enterprises must devote lots of time and money to making entirely sure that partners are keeping the integrity of their obligations if there is no trust. Auditors, securities analysts and credit rating agencies within the financial system *failed to fulfil their obligations* as builders of trust by focusing more on their short-term gain than on the long-term welfare of those who rely on (or would have relied on) their professional judgements.

In the following we will consider various manifestations of systemic faults in turn: first, we examine the connection between growing complexity and increasing homogeneity; then we look at how fundamental uncertainty relates to financial innovation, and then we discuss the vulnerability of the prevailing risk narrative. In the last section, we make an attempt to outline a hypothetical model of the financial crisis based on systemic faults.

5 Rappaport (2012) argues that these unnatural incentives governed the value of large publicly listed companies, and induced managers to take irresponsible and value-deteriorating risks. Risks such as these led to the failure of once illustrious financial institutions such as Bear Stearns, Lehman Brothers, Merrill Lynch and AIG.

GROWING COMPLEXITY AND INCREASING HOMOGENEITY

The global financial crisis examined here indeed differed in several respects from earlier crises, with two structural features of the financial network playing a defining role in this. These two features evolved over a long time, but at an unusually rapid tempo during the decade preceding the crisis; on the one hand *complexity*, and on the other hand *homogeneity*. *Haldane* (2009) examined the phenomenon using *network theory*, establishing as a starting point that the financial network had become increasingly *complex* as time went on, and *decreasingly diverse* in its applied methods.

In the world of portfolio investments, *diversification* has always been seen as desirable, and this desire only strengthened in the decade preceding the crisis. The hope was to eliminate risk through diversification, by placing more eggs in the basket. However, this strategy produced the opposite effect: the more eggs, the greater the fragility of the basket, and the higher the probability of bad eggs appearing.

Securitisation *increased the dimensions of the financial system*, and thus the complexity of financial networks. Nodes grew, and interconnections between them multiplied. As a result, the diversification strategies generated by individual firms *increased uncertainty* across the system as a whole. Financial firms looked alike and responded equally: diversification strategies by the various firms led to a *lack of diversity* across the entire financial system, which therefore ended up exhibiting both greater complexity and less diversity.[6]

Two important mechanisms of the system that *Haldane* (2009) calls recent financial network dynamics are *connectivity* and *feedback*. "Interconnected networks exhibit a knife-edge, or tipping point, property. Within a certain range, connections serve as a shock-absorber. Connectivity engenders *robustness*. Risk-sharing – diversification – prevails. But beyond a certain range, the system can flip the wrong side of the knife-edge. *Interconnections serve as shock-amplifiers, not dampeners*, as losses cascade." The tipping-point dynamics described by *Haldane* closely conform to the recent behaviour of the financial system. A lengthy period of robustness (the decade preceding the crisis) was followed by a period of *financial fragility*. Three distinct key points are worth highlighting. *Firstly*, it is clear that the size and interconnectivity of international financial networks *increased* significantly in the two decades before the crisis. Nodes swelled, and links became fatter and more frequent. The network became considerably denser and more complex. What applies to connections between countries was also probably

6 Haldane (2009) refers to possible analogies – or the lack of them – in other disciplines, such as ecology, genetics and epidemiology. In ecological systems, for example, complexity and diversity together guarantee stability, while a lack of diversity heightens fragility. In the epidemiological analogy, "flight" from infected cities has taken the form of flight from infected assets.

true of links between institutions within countries. *Secondly*, the global financial system appears to comprise a relatively small number of financial hubs with a large number of spokes. *Thirdly*, *the average path length of the international financial network has also shrunk*, and with the network barely extended beyond 20 countries, the impression of a "small world" has been created.

The second important mechanism was *feedback*. During this financial crisis, in the face of fears of *infection*, financial institutions exhibited similar behavioural responses. Escape from infection meant preserving liquidity and selling toxic assets. However, contrary to an epidemiological context, such behavioural responses *aggravated stress effects* in the financial system. The way this process unfolded is very illuminating. Banks entered the crisis with an extensive portfolio of risky assets. As risk apparently materialised, banks – rationally enough – endeavoured to protect themselves from infection from other banks by hoarding liquidity rather than lending it onwards. The result was enduring stress on financial markets. *Haldane* (2009) confirmed that banks' dependence on one another within the interbank network meant that *individually rational actions generated a collectively worse funding position for all*. This in turn contributed to another behavioural response. Unable to easily finance their asset portfolios, some institutions opted to escape by selling off assets. This then led to *downward pressure on asset prices*, thus spreading the infection to other financial institutions. Others' immunity to infection was simultaneously weakened by the widespread marking of assets to market. Regarding behavioural dynamics, the panic hoarding of liabilities and distress sales of assets became important attributes of the crisis. If we place these responses within a network framework, we can clearly see both the individual *rationality* and contrasting *irrationality* evolving as a result of the collective externality; it was these two things in antagonism that drove the actions of market players. This fear of infection in the behaviour of financial institutions added to the "robust-yet-fragile" condition of the financial network.

Diversity within the financial sector *decreased* for two different reasons: the uniform pursuit of returns and the specific management of risk. The general pursuit of yield expectations led to race for return on equity among all types of financial enterprise. As these collectively gravitated towards high-yield investments, *business strategies were replicated throughout the financial sector.* Examining global banks, large complex financial institutions, insurance companies and hedge funds, the yield curves of all followed a strikingly *similar pattern*, both in the run-up to the crisis and the subsequent decline.[7]

7 Haldane (2009) demonstrates that the rolling average of pairwise correlations across several financial sectors was 0.9 throughout the period 2004–2007. At the height of the credit boom, the imitation of financial strategies became near-cloning. What was true across financial subsectors was also true within them. The average pairwise correlation between hedge funds' strategies was practically zero at the turn of the century, but had risen to around 0.35 by 2008.

Management of the risks arising from these strategies amplified homogeneity. Through these channels, financial sector balance sheets became homogenised and financial investment strategies monocultural. As a result, the resistance to infection of the financial system as a whole was weakened. As we could see during the crisis, the financial system – for individually rational reasons – displayed growing complexity and homogeneity. This resulted in a financial network that was robust yet fragile, susceptible to tipping points and disruptions, and even to shocks of varying degrees.

Bronk (2011) interprets the role that the investment monoculture and homogeneity played in the crisis within a broader context. He proposes myopia induced by seeing things in a single way as a cause of the crisis. If investors internalise a single perspective, he argues, then they will simply not be predisposed to understanding atypical phenomena. Analytical monocultures such as this not only blinded investors to the unexpected but also helped create a dangerous *behavioural homogeneity* and widespread *correlations* on markets, which became very dangerous indeed.[8] One of the many factors omitted from risk models in the run-up to the crisis was the destabilising increase in correlations, which was caused by rapid internalisation of the same return-on-equity investment strategies; widespread adherence to the same accounting conventions (placing liabilities off-balance-sheet); and application of the same risk models across so many markets. When everyone pursues a similar financial market strategy, with the same starting points for reducing exposure, then many will want to back away simultaneously when something unexpected occurs. Investors, risk managers, and regulators need to be aware of the extent to which *dominant narratives*, theories and norms on the market construct behavioural conventions.[9] The decade preceding the financial crisis engendered an explosion in the dimensionality, and hence the complexity, of financial networks. Among other impacts, this enhanced the robust-yet-fragile nature of the system and uncertainty over counterparty pricing within the network. Claims outside the system increased rapidly in the decade running up to the crisis, fuelled by off-balance-sheet activity. Intra-system claims on this scale similarly exacerbate the fragility of the network. When one node collapses, a ripple in the system risks developing into a tsunami – as the experience of Lehman shows.

The situation that evolved in the network was reminiscent of the recognition many decades earlier by *Simon* (1962) that hierarchical networks can be broken

8 Stiglitz (2011) made a detailed examination of the relevance of monocultures with respect to the crisis. He observed that "we often discount information that is contrary to our cognitive frame." He also contended that the standard models of economists "made them prone to equilibrium fictions and consequently blind to the bubbles that were building." (op. cit., p. 168)

9 Keynes (1936) asserted that the key to successful investing – at least in the short term – is to anticipate shifts in the interpretations and conventional frameworks of other market investors (op. cit., pp. 154–155).

down into their parts if the number of interactions within the system is restricted. The system of financial networks, both preceding and during the crisis, showed quite the opposite tendency: *as the number of intra-system interactions grew, the decomposability of the system as a whole was reduced*. Innovation appearing in the form of structured assets created a non-hierarchical network structure. As *Haldane* (2009) points out: "Financial engineers created products in which elements of a loan portfolio were reassigned to a higher-order sub-assembly. In this way, an automatic dependence was created among almost every sub-structure. By contract design, *the overall financial system became impossible to decompose into separable sub-structures*." Under the old financial order, mutual funds, commercial banks, investment banks and universal investment funds were sub-structures, but within the network structure, this separability no longer applies.

HOW FUNDAMENTAL UNCERTAINTY RELATES TO FINANCIAL INNOVATION

If we penetrate more deeply in our search for the causes of the financial crisis, then we must recognise the extent to which actors in the financial system – from investors to bankers to regulators – are unable to appreciate the central importance of *fundamental uncertainty* and its relationship to financial innovation, as well as the barriers which uncertainty presents to the application of risk models.

Skidelsky (2009) makes a distinction between "epistemological" uncertainty (where relevant probabilities are unknown) and "ontological" uncertainty (where they are logically unknowable) (op. cit., p. 88). *Epistemological uncertainty* includes the inherent difficulty of grasping all the multifaceted aspects of what is occurring. Although shifting the boundary between epistemological uncertainty and measurable risk is theoretically possible, the non-linear behavioural dynamics of market players cannot be approached with simple frequency distributions or a precise determination of the likely spread of future returns. *Ontological uncertainty*, by contrast, implies the impossibility of knowing even the categories and possible nature of what is yet to be created or yet to evolve. *Lane* and *Maxfield* (2004) observe that this breed of uncertainty is represented by radical *innovation*, which revolutionizes market parameters and the range and nature of possible outcomes, while also allowing for the emergence of *genuine novelty*. This latter kind of uncertainty can never be turned ex-ante into measurable risk.

It was *Shackle* (1979) who made the connection between the uncertainty we face and the creative shaping of our future. As he put it, the future is unknowable because it is *still to be created* by the original choices we (and others) will make and new possibilities we (and others) will imagine. In other words, there is an inevita-

ble *ex-ante ontological uncertainty* about the direct outcome of any innovation or novel choice we make, and this uncertainty is compounded by uncertainty about the secondary creative reactions of others. *Shackle* casts doubt on the standard financial market notion that forward-looking market valuations can be stable and efficiently priced; that there is a static reality "out there" on which rational expectations will converge in response to competitive pressures. As *Shackle* puts it, "valuation is expectation, and expectation is imagination" (*Shackle*, 1992, p. 8). *Bronk* (2011) takes the view that *Shackle*'s opinion deserves recognition in situations abounding in novelty and innovation. Financial market modellers tend to ignore the fact that *innovation creates uncertainty*, breaking predictable connections *between past and future*. By disturbing previously stable regularities and changing key market variables, innovation undermines the justification for making probability forecasts by historical frequencies.

Financial innovation has become an important factor in the complexity of network chains. This assumed a distinctive form in the decade preceding the crisis with the mass spread of structured credit (with risk broken down into components and then reconstituted), resulting in *a set of interconnected liabilities*. With each restructuring of the elements, the web branches out and the network's dimensionality multiplies. End-investors in these instruments do not even know the names of companies in their portfolios. It is an undeniable fact that epistemological uncertainty grew in the two decades leading up to the financial crisis. The complexity of financial markets and products increased, with the huge volume of relevant information overwhelming the mental capacity of market participants, and – though many disputes it – outstripping the growing ability of computers to process the information.[10] The relevance of ontological uncertainty is borne out by the *novel dynamics* of both primary and secondary markets. These shifts were determined from the mid-1990s onwards by the invention of new subprime mortgage products and new derivative instruments for securitizing mortgage loans and bundling them up to form products more exotic than ever before. In light of the breadth and depth of innovation, historical data on the probability of default on mortgage loans lose their relevance, as do data on credit default correlations between regions (or on volatility and correlations in related secondary securitization markets). *Peston* (2008) stresses that innovations make it impossible to rely upon the earlier financing environment as embodied in historical data. If innovation severs the possible

10 As an illustration, let us take an investor who manages a set of financial claims. In the case of asset-backed securities (ABS), collateralized debt obligations (CDOs) and credit default swaps (CDS), the investor would need to process a vast quantity of information. Haldane (2009) calculated that this would run to around 200 pages for simpler products, but that in the case of a debt instrument restructured several times they would need to read more than a billion pages of relevant prospectus information in order to fully understand the components of the financial product (op. cit., p. 17).

connection between past and future, then historical data cannot provide a firm foundation for risk models when pricing structured financial products.

Bronk (2010) draws attention to the moral dilemma between innovation and predictability. To make financial market processes (and the risks therein) more predictable, you need to *limit innovation*, which raises serious concerns for the operation of the financial sector, potentially hurting profits, while also limiting losses and uncertainty. If we accept the logic espoused by *Knight* (1921), then we must agree that profit can only be made if there is genuine uncertainty in a competitive system. As he wrote: "Profit arises out of the inherent, absolute unpredictability of things, out of the sheer brute fact that the results of human activity cannot be anticipated" (*Knight*, op. cit., p. 311). Big profits in the financial sector could only be generated if investors, analysts, and regulators exposed themselves to the fundamental uncertainty created by innovation.

THE VULNERABILITY OF THE PREVAILING RISK NARRATIVE

Knight (1921) and *Keynes* (1921) made a crucial distinction between "measurable" risk and "unmeasurable" uncertainty. From the beginning of the 1980s, many economists fell under the spell of the rational expectations hypothesis and associated model-based forecasting. Numerous representatives of the economics mainstream endeavoured to either ignore the uncertainty category or to turn it into measurable risk. According to *Hodgson* (2011), fundamental uncertainty has been ignored in predictive modelling for decades. Since the mid-1990s, financial markets, regulators and a large slab of the corporate sector have fallen under the influence of another promise, what *Power* (2007) terms *a grand narrative of risk management*. A whole series of value-at-risk (VaR) and other models pledged to lessen the risk of loss or failure based on extensive analysis of historical data. Given that innovation snapped the predictive threads linked to the past and looking to the future, decision-makers responsible for risk became less and less successful in guiding financial processes unfolding amid a climate of uncertainty and had to content themselves with the *illusion of control*. *Haldane* (2009) refers to another illusion in the context of risk management. In his view, the belief that "a new era had dawned, one with the simultaneously higher return and lower risk" was false (op. cit., p. 4). In the operation of financial markets, the narrative of risk management mainly hinged on the fact that market players had not taken into account the distinction between measurable risk and unmeasurable uncertainty.

Whether uncertainty can indeed be eliminated from model-based forecasting, or whether it can always be translated into measurable risk, is highly debatable in light of events in the crisis. Help may be provided by another distinction which

Skidelsky (2012) makes between *asymmetric information* and *systemic ignorance*. Information asymmetry, in which one participant in a market transaction has an informational advantage over the other party, may easily lead to "unethical behaviour," to the mispricing of financial products and denuded markets, characterised by a *lack of trust* between parties that dries up market trading channels. Greater transparency and the continuous disclosure of information may theoretically provide a solution to such problems, contributing the most to the correct pricing of risk. The problem of systemic ignorance is much harder to solve since every participant is confronting genuine uncertainty in this case. The size of the role played by information asymmetry in the financial crisis examined here is a critical issue that's hard to determine, as is the role played by genuine uncertainty as embodied in systemic ignorance (*Skidelsky*, 2012, op. cit., p. 45). With systemic ignorance, market transparency becomes essentially meaningless. *It is exceptionally difficult for financial institutions to calculate future risk when operating in a financial system interwoven with the interconnections of an increasingly complex network*. *Mirowski* (2010) warns that when this complexity reaches the limits of computer manageability and exponentially multiplies the routes to *emotional contagion*, then epistemological uncertainty threatens to hinder the modelling of market dynamics, and when something goes wrong on the market, then uncertainty will lead to *instability*.

Zandi (2009) voices strong criticism of rating agencies' fundamentally faulty perception of risk, which may have led directly to the erroneous pricing of risk:

> *"The rating agencies badly misjudged the risks. Poor-quality data and information led to serious miscalculations. The agencies were not required to check what the originators or servicers of the mortgage loans told them, and this information was increasingly misleading. The agencies also had the difficult task of developing models to evaluate the risk of newfangled loan schemes that had never been through a housing slump or economic recession. Without that experience, the models were not up to the task they were asked to perform. The ratings were supposed to account for the range of things that could go wrong, from rising unemployment to falling house prices, but what went wrong was much worse than they had anticipated."* (op. cit., p. 19)

In connection with the financial crisis, *Greenspan* et al. (2010) stressed that financial market players believed in the emergence of insatiable demand for the array of financial products on offer and that they could sell their existing asset portfolios without loss. However, they failed to recognise that *the conversion of balance sheet liquidity to effective demand is largely a function of the degree of risk aversion.* Risk aversion embraces all factors that influence individuals' willingness to engage in the risky activity and is a human trait that also impacts the

pricing of income-earning assets. By definition, the degree of risk aversion ranges from zero to full avoidance of risk. The process is apparent, on the one hand, in periods of euphoria (when risk aversion falls below its long-term, trendless average), and on the other hand in times of fear (when risk aversion rises above its average). In this sense, we can define a bubble as a protracted *period of declining risk aversion*, marked by capitalization rates falling significantly below their long-term trendless average. *Falling capitalization rates, in turn, drive up asset prices to an unsustainable level.* All bubbles burst when risk aversion reaches its minimal level. In an ever-intensifying climate of euphoria, risk managers, the central bank, and regulators failed to assess the negative "ballooning" deriving from the distribution of risk consequences. The risk management system failed because, in the absence of sufficient relevant data, analysts presumed a very limited reinsurance risk. When risk premiums remain low over an extended period and investors are willing to make bids on all manner of financial assets, even on the high-risk portions of collateralized debt obligations (CDOs), then this creates the *illusion of permanent market liquidity*, which had a tendency to obscure everything in the period leading up to the financial crisis.

Cassidy (2009) criticises the popular school of thought that ignores market errors, unilaterally reinforcing the illusions of stability and predictability. The efficient market hypothesis holds that market prices are reliable indicators of fundamental value since market participants are compelled by competitive pressure to make optimal use of the information at their disposal, to avoid systematic errors in forecasting, and to rapidly revise expectations in the light of new evidence. In this approach, any deviation from the fundamentals in market valuation must essentially be *random and short-term*. This hypothesis had significant implications in the context of the financial crisis discussed here, as financial markets were assumed to be self-regulating and were regarded as the best representation of fundamentals. Based on this view, regulatory intervention would only have been necessary if there was an information asymmetry, or if information transparency between market participants needed to be improved. The crisis of 2007–2009 fundamentally called into question the dominant narrative on financial markets and in risk management. Doubts arose as to whether the market was pricing in available information and knowable risks in an efficient manner. As far as market expectations and pricing were concerned, it emerged that these were not uncommonly related closely to *deception*, and were driven by successive waves of *exuberance* and *fear*.

During the financial crisis under discussion, the proposition that people always rationally pursue their goals was called into question. According to *Shiller* (2009), they sometimes act irrationally, think erroneously in the short term, or move only for the sake of acting in their responses to the events of an uncertain world. This

framework explains how confidence in the financial sector has transformed into disillusionment, resentment and greed in the wake of stories of deception and fraud.

Based on the above, it is no longer enough to rely on human behaviour and economic rationality. The modern financial theory is based on rational choice, with consideration for market errors but ignoring the behavioural perspective.

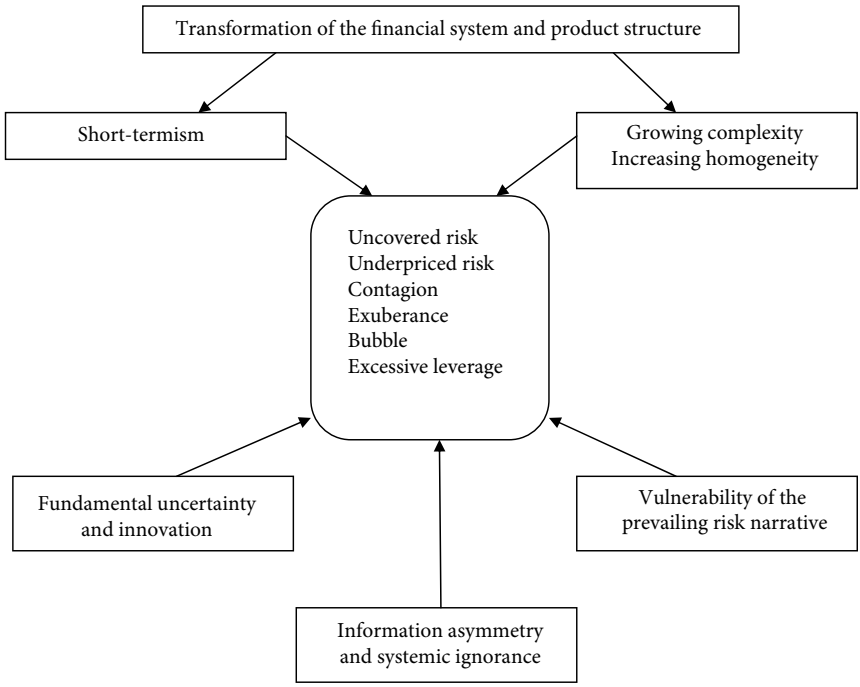
Coffee (2009) cites recent empirical research showing financial markets to be complex, evolutionary and dynamic systems incorporating both rational and irrational behaviour patterns. To mention an example, the ill-advised expansion of investment banks burdened a substantial number of their investments carried out to acquire loan originators and connect them with real estate companies. As a result, they took on additional risk by concentrating on the real estate market and were thus unable to adapt flexibly to the market downturn when property prices began to plunge sharply. *When competitors pursue the same strategy – for example, investing in mortgage-backed securities – then they underestimate their risk.* If everyone does the same thing, then everyone will suffer when things go wrong. In a saying attributed to *Keynes*: "Worldly wisdom teaches that it is better for reputation to fail conventionally than to succeed unconventionally."

A HYPOTHETICAL MODEL OF THE FINANCIAL CRISIS BASED ON SYSTEMIC FAULTS

Having analysed the factors that gave rise to the financial crisis, we must once again ask the question of whether we may regard the crisis as cyclical in nature, or rather as a tragic confluence of systemic faults in the financial system itself. The other question that awaits an answer is whether factors of investor behaviour (irrational exuberance, fear, euphoria) may have played a decisive role in shaping the causes of the crisis.

If we incorporate the above-examined factors based on their direction of impact into a simple model, then we can present crises in the following form:

Figure 1
A hypothetical model of the financial crisis



Both overall and in its details, our train of thought has suggested that the period between 2007 and 2009 represented more than a cyclical financial crisis arising from natural movements of the market, and more than the periodically inevitable accumulation and drainage of excesses. For this reason, we searched for the causes of what we presume was *a crisis at the systemic level*. In the two decades before the financial crisis, changes occurred in financial institutions and markets which proved difficult (or impossible) to integrate into the paradigmatic framework of the financial system. Bank financing based on the collection and distribution of savings was replaced by the creation of financial products and their sale on financial markets; the appearance on the market, via securitisation, of a mass of structured financial products; the transformation of risk into a commodity to be bought and sold; the increasing role of companies not registered as financial institutions in the trade of financial products; and the ever-expanding volume of derivative instruments taking possession of a growing proportion of financial markets. In such a situation, there was no limit to the credit that could be extended, and the all-pervasive abundance of funds became not just an illusion but a reality.

This series of new developments called into question *the expediency of adhering to paradigmatic principles such as portfolio diversification, increasing leverage, low or negative correlation, long-term value creation, sovereign investor decisions, transparent financial products, innovation in general and specifically in the financial sphere.*

Diversification had always been regarded as a means of mitigating risk. However, with the rapid proliferation of financial products, an increasing number, and a variety of investments appeared in investors' portfolios, carrying unknown risks not uncommonly of an infectious nature, and this *inverted* the significance of diversification. The extension of investment portfolios beyond all borders increased their robustness, but also their fragility. The same happened in the case of applied investment strategies, risk models, and balance sheet structures. Variety was replaced by *a lack of diversity.* Every investor endeavoured to maximise the same indicators, using the same risk models and the same practice of placing liabilities off-balance-sheet. Diversification in the broad sense eventually ended up *increasing risk* instead of reducing it and led to a lack of diversity rather than a variety of methods.

The fundamental aim of increasing *leverage* is to generate profit (through interest savings). At the same time, investors using leverage must also be aware that a substantial increase in leverage exacerbates risk and raises the likelihood of losses. Developments in the financial crisis in question left little doubt that both leading and secondary players in the financial system had carried out transactions with *unrealistically over-leveraged financing.* A broad swath of investors had run into debt while more than exhausting the criteria of *ethical risk*, all to finance their swelling portfolios. Leverage ratios in the period running up to the financial crisis were beyond the boundaries of the absurd, and the prudent value of this indicator deteriorated to an unprecedented extent as a result.

Portfolio diversification was built on the assumption that the portfolio should contain assets with a rate of return showing only a slight *correlation* to that of assets already included in the portfolio, or in the optimal case a correlation directly *negative in value*. The *behavioural homogeneity and investment monoculture* that became prevalent in financial markets gave rise to a marked positive correlation. Investors following the same investment strategies would display forward or backward momentum simultaneously, and this carried dangers from the point of view of market movements. One way of looking at things meant short-sightedness. If investors accept a single outcome as their expectation, then they may prove less responsive in adjusting to unexpected events. The desirable negative correlation in portfolio diversification was replaced by a *close positive correlation* in investment strategies, incentive schemes, and financial market processes.

In recent decades on financial markets, investors have demonstrated a predominant tendency towards *short-termism,* as reflected in the short-term holding

of assets and rewarding of managers responsible for other people's money for their performance in the short term. A large number of investors are interested in "passing on" the packages of securities they hold, and in maximising their short-term profit by *shifting risk onto others*. The prevalence of short-termism has pushed the classic principle of long-term investor value creation into the background, encouraging a growing number of investors to *shift risk onto partners*, without knowing the scale of risk contained in a given securities package. This investor strategy often leads to the destruction of value and defrauding of business partners.

Growing behavioural homogeneity in the world of investments meant *sovereign* investor decisions were replaced by *imitation*. As a consequence of the monocultural handling and offloading of risk by financial institutions, diversity in methods and procedures gave way to homogeneity in investor behaviour. Leading individuals and groups at financial enterprises, in following strikingly similar trajectories in investment, efficiency and market participation created a fertile breeding ground for infection, and for a strategy provoking a downturn in the market. Homogenised balance sheets and a monocultural risk management strategy – with the increasing danger of contagion – reduced the resistant capacity of financial markets. Mass flight from infected assets, rather than lessen the danger of contagion, amplified the effects of stress. As investors imitated each other, the dominance of sovereign decisions gave way to the reign of the *herd mentality*.

In the decade preceding the crisis, the structure of financial products shifted rapidly from transparent products to complex, structured, often difficult-to-define *exotic products*. In a significant number of cases, neither issuers nor brokers nor end investors were aware of the inherent risk in such financial products. As products, financial networks and interactions grew in complexity, the transparency of both products and the system as a whole decreased, so that – in addition to the information asymmetry thus arising – the widely emerging pattern of behaviour was typified by systemic ignorance and a lack of awareness among financial players of the real prospects, risks and dangers of investment packages. The increasing *opacity* of financial products intensified the *epistemological uncertainty* of investors to an unprecedented degree, leading to more bad decisions and mounting chances of the infection spreading further.

Innovation in financial products, though opening broad perspectives for investors, nevertheless – paradoxically – intensified market uncertainty to a scarcely credible degree. This happens because new financial products appearing en masse sever the link between past and future, as the inherent continuity of transparent products is replaced by the discontinuity of structured products. Well-founded forecasts can scarcely be made based on the historical prevalence of prices, returns, and trends since earlier regularities have unravelled as a result of innova-

tion. The paradoxical nature of this situation, despite all these disadvantageous effects, is that it would be a mistake to curb or "eliminate" all innovation. The main lesson from innovation's growing impact on uncertainty may be that participants in financial markets and the investment system need to know that fundamental uncertainty can never be eliminated.

If diversification in the operation of financial markets prior to the crisis, instead of reducing risk, resulted in a lack of diversity and exacerbated the fragility of financial networks; if the growth of leverage to absurd proportions increased risk and losses rather than being a source of profit; if the desirable negative correlation between portfolios and markets gave way to a prevailingly close positive correlation; if an interest in long-term value creation was replaced by an attitude of short-termism among investors; if sovereign investor decisions gave way to the replication of investment strategies throughout the financial sector; if transparency in financial products was superseded by baffling complexity; if the unequivocal impact of innovation in creating perspectives was eclipsed due to the fundamental uncertainty caused by financial novelty, then we have good grounds for assuming that the global financial crisis we have examined here *was not a cyclical crisis springing from disturbances in the market's operation, but was instead due to a tragic confluence of systemic faults in the financial system*. Events on financial markets in the two decades leading up to the crisis pried apart the paradigmatic framework of the financial system that had functioned for many decades previously, replacing it with a new practice that precipitated a crisis, which can be regarded more as a negation of the old paradigms than as the source of new, sound operating principles.

Finally, we must answer the question of what role may have been played by investor behaviour, beyond the errors and tensions within the financial system itself. When identifying the causes of the crisis, we often encounter explanations that pinpoint the deeper causes in the manias, vagaries and collective hysteria of investors. We propose that confusion in investor behaviour is induced by chasing the incentives of a faulty system and that this leads to *rationality in individual decisions giving way to collective irrationality*. At the height of the crisis, the collapse of numerous financial institutions occurred according to the (sometimes distorted) rules of the system, and not due to investor madness. Behavioural confusion was not the cause of the crisis but provided a form of motion and means of expression for the operation of a faulty and tension-ridden system.

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