

Global Governance and Systemic Risk in the 21st Century: Lessons from the Financial Crisis

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Abstract

Recent decades of globalisation have created a more interconnected, interdependent and complex world than ever witnessed before. While global policy has focused on facilitating integration, the implications of growing interdependence have been largely ignored. The acceleration in global integration has brought many benefits, but it also has created fragility through the production of new kinds of systemic risks. This article provides a framework for understanding these new 21st-century systemic risks and examines the challenges they pose to global governance. The 2008–2009 financial crisis will be used to illustrate the failure of even sophisticated global institutions to manage the underlying forces of systemic risk. We show this is symptomatic of institutional failure to keep pace with globalisation. The failure of the most developed and best-equipped global governance system, finance, to recognise or manage the new vulnerabilities associated with globalisation in the 21st century highlights the scale and urgency of the global governance challenge.

Policy Implications

- The rise of systemic risk requires a systemic response. Effective global governance and policy development have never been so necessary and urgent.
- The financial crisis illustrated that current global financial institutions are inadequate in their policy response to systemic risk and cannot keep pace with innovation and increasing system complexity in global finance. Deeper structural changes are required, including regulatory reforms.
- The institutional rigidity and profound shortcomings of global institutions apply not only to global finance, but to other looming systemic risks in the future. Neither the current global governance system, nor the planned reforms, meet the test of addressing new global systemic risks.
- Global governance requires radical structural changes in existing institutions and the development of new global institutions that reflect the realities of new global power balances and address the forces of systemic risk in the 21st century.

1. Globalisation in the 21st Century

While the precise definition and various periods of globalisation have been widely studied and debated (see Held et al., 1999 for an overview), the latest wave of globalisation has been unique, with particularly widespread and intense integration of markets, trade and finance. This has been facilitated over the past 20 to 30 years by seismic policy shifts, such as the economic and political reform process in China, and much of Asia, Latin America and Africa, the fall of the Berlin Wall in 1989, European integration following the signature of the 1992 Maastricht Treaty, and the ideological convergence around market primacy ushered in during the Reagan, Thatcher and Kohl era in the 1980s. According to International Monetary Fund (IMF) and World Trade Organisation (WTO) reports, between 1980 and 2005, global foreign investment inflow increased 18 times, real world GDP growth had increased by approximately 32 per cent and world merchandise imports and exports increased more than sevenfold.

Technological innovation has also accelerated economic integration through both virtual and physical time-space compression (Harvey, 1989). While the development of fibre optics, the Internet and mobile telephony, as well as exponential growth in computing power all revolutionised the underlying architecture of systems by *virtually* increasing proximity, *physical* proximity has also increased through technological innovation in transport and infrastructure. Population growth and urbanisation, too, are driving physical proximity, integration and interdependence. The world population has nearly doubled since 1950, and the urban share has increased dramatically from 29 per cent in 1950 to over 50 per cent in 2009.¹

Policy shifts, technological innovation and increased population density have also been paralleled by changes in managerial practice and accounting standards, which extended the 'Just-In-Time' management strategy to emphasise that inventories reflect tied-up working capital, and must be made to 'sweat' (Hutchins, 1999). This has shortened the time between the production and consumption of goods and services, while outsourcing and global

logistics chains have reflected the declining significance of geography in determining production and trade processes. In short, by the turn of the 21st century, globalisation was characterised by a more interconnected, interdependent and complex world than ever witnessed before.

The benefits of global integration have been associated with unprecedented leaps in human development indicators (Goldin and Reinert, 2007); however, globalisation is not a benign process and can be viewed as a double-edged sword. One of the downsides to globalisation, that of increased inequality between and within countries, has been widely studied, with Stiglitz (2006), Goldin and Reinert (2007) and others stressing the need for national and global policies that enhance the potential benefits and mitigate the downsides of integration.

The existing literature, however, fails to appreciate the extent to which the current tidal wave of globalisation is different, especially in terms of the levels of interdependency and complexity and how this has resulted in an additional downside to global integration. This second 'side-effect' of globalisation has been the unintended and hitherto largely ignored production of systemic risks, which are 'breakdowns in an entire system, as opposed to breakdowns in individual parts or components, and are evidenced by co-movements amongst most or all of the parts' (Kaufman and Scott, 2003, p. 371). Kaufman and Scott describe three main concepts of systemic risk: (1) 'macroshock' triggered when relatively modest tipping points or regime shifts hit their threshold and produce large, cascading failures on most or all of the system; (2) shock diffusion through the network via contagion (transmission, feedback and amplification of risk); and (3) 'common shock', which is not the result of direct causation, but is evidenced by indirect impacts of systemic risk.

While historically the term systemic risk has referred only to collapses in finance, recent decades of globalisation have created a 'global risk society' characterised by new and much broader risks in the 21st century (Beck, 1999). The fragility of the system as a result of these new vulnerabilities now challenges the very core of the benefits that globalisation has produced and is a fundamental challenge to global institutions.

This article will conceptualise systemic risk in the 21st century, examining the 2008–2009 financial crisis as the first example of systemic failure of the 21st century. We will then argue that the global policy response to the financial crisis has been inadequate and reflects a failure to understand or address underlying systemic risks plaguing the economy. Drawing lessons from the financial crisis, we then highlight the real threat of systemic risk in other 21st-century challenges, and expose the profound shortcomings of global institutions to manage these other looming risks in the future. Neither the present institutional structure, nor currently planned reforms, are fit for the challenges of the 21st century, as they fail to reflect the

fundamental structural changes in global interactions and the underlying threat of systemic risk.

2. Conceptualising Systemic Risk in the 21st Century

While systemic risk has been seen as a threat caused by unpredictable, highly improbable, exogenous stochastic events (Albeverio et al., 2006; Taleb, 2007), we see systemic risk as reflecting endogenous structural weakness that can be predicted and better understood through network theory, interactions between actors and through understanding the integrated nature of global risk society, where anthropogenic 'manufactured' risks are predominant (Giddens, 1999; Rees, 2003).

The 21st century has been characterised by the rise of network structures that are significantly more complex, interdependent and integrated than those of previous eras. Population and economic growth, integration and technological progress have facilitated these networks by forging exponential increases in the number of nodes and pathways through which transmission can occur at unimagined speeds and with global reach. While these networks involve the transmission of materials, capital, information and knowledge, recent decades of intense global integration mean that these highly interconnected networks also have the potential to originate and propagate risk. This central property of interconnectedness in networks (Jervis, 1997) can be paradoxical in both its structure and impacts. Increasingly connected networks facilitated by globalisation can lead to both greater robustness and more fragility (Dodds et al., 2003; May and Anderson, 1991; Watts, 2002). Haldane (2009a) draws on network theory to describe the two main characteristics that drive this duality, notably complexity and homogeneity.

Systems that have a greater range of suppliers and increased connectivity are more robust because complexity can be a defensive and self-regulatory mechanism for a system to protect itself through risk dispersion (Allen and Gale, 2000; Elton, 1958). Indeed, Allen and Gale (2000) show that risk asymptotically approaches zero as connectivity increases because risk sharing increases as the number of nodes and links increases. This is true of financial systems, manufacturing services, intellectual property and ecosystems. It is important to note, however, that increased connectivity and interdependence can also lead to increased fragility. Once a tipping point is triggered past its threshold, connectivity can amplify risk and spread risk instead of sharing it (May, 1974). Recent studies have revealed that greater connectivity decreases individual risk, but increases the severity of systemic risks (Battiston et al., 2009; Gai et al., 2007; Watts, 2002). Studies also indicate that scale-free networks, with many low connectivity 'peripheral' nodes and few highly connected 'hub' nodes, are more robust since random disturbances are statistically more likely to

fall on peripheral nodes (Barabási and Albert, 1999). At the same time, however, the crucial hub nodes with a large number of interconnections are more vulnerable to a targeted attack (Albert et al., 2000; May and Anderson, 1991).

Simon (1962) explains that most complex systems exhibit high levels of self-similarity and so they can be simplified in their description in order to understand them more robustly. The process of simplification and reductionism, however, can increase system fragility, as has already been demonstrated in industrial and ecological systems (Elmqvist et al., 2003; Korhonen and Seager, 2008). Indeed, homogeneity is the second destabilising characteristic of complex networks and it occurs when diversity is decreased and/or when system redundancies are eliminated.

Network theory can help explain why systemic risks are complex, relational, interconnected and why they are therefore extremely difficult to predict and regulate. Increased complexity and interdependency of systemic risk across geopolitical boundaries and national contexts demands participation between countries where intergovernmental negotiations increasingly affect domestic policy (Lawrence et al., 1996). Systemic risk also creates a governance gap through which nonstate actors such as nongovernmental organisations, multinational enterprises, civil society and global institutions have become increasingly influential and collaborate with state actors, with this increasing role being described as the most significant recent shift in international governance (Doh and Guay, 2006; Slaughter, 2004). This challenge is one of a 'power-play between territorially fixed political actors (government, parliament, unions) and non-territorial economic actors (representatives of capital, finance, trade)' (Beck, 1999, p. 10). This power play along with the interjurisdictional nature of systemic risk has, for example, challenged state sovereignty and shifted Westphalian governance to include elements of post-Westphalian governance, where 'deterritorialisation' of social, environmental and economic interactions is evident (Beck, 1999; Held and McGrew, 2003).

3. Systemic Risk in the 21st Century: The Financial Crisis

The Rise of Financial Services in the 21st Century

The recent financial crisis is the first clearly evident systemic crisis of the 21st century. It is vital therefore that we learn the lessons of the financial crisis in order to manage deeper and more damaging global challenges, such as climate change and global pandemics, and to avoid a destabilising cycle of more acute future financial crises.

At the turn of the 21st century, liberalisation of capital markets and technological innovation resulted in the development of an increasingly complex 'financial network', where the speed, value and volume of financial transactions had increased sharply both domestically and internationally

(White, 2004). In particular, the pace of change and innovation in financial markets between 1998 and 2007, the 'Golden Decade', saw the explosive growth of sophisticated financial instruments such as credit default swaps, collateralised debt obligations and an increase in resale markets for capital (Gai et al., 2007). Whereas the trading of derivatives had been marginal in the three previous decades, by the turn of the century the global over-the-counter derivatives market had reached US\$100,000 billion of outstanding deals. By the end of the 'Golden Decade' in 2007, the market had expanded to US\$600,000 billion, 16 times global equity market capitalisation and 10 times global gross domestic product.² Globally integrated markets and innovation had led to a transformation of the financial landscape. Integration and new networks greatly increased the robustness of the finance system, but interdependence, complexity and the growing gulf between oversight and market innovators simultaneously made the global finance more brittle and fragile.

The financial crisis can be described as a systemic risk that began with the advent of an unregulated subprime mortgage market in the US, which ultimately destabilised the market for credit default swaps, collapsed markets for securitised instruments across global financial systems and triggered a global liquidity crisis. While many blame the burst of the real estate bubble for the financial crisis, few examine how economic integration and financial innovation in a deregulated environment created a financial network vulnerable to systemic risk. Governance gaps at all levels of the financial system, from global to individual actors, allowed regulatory arbitrage, bonus gouging and other corporate governance failures to spiral out of control. However, these failures are symptomatic of a deeper malaise. The failure at all levels of financial governance reflects the inability to understand the deep structural changes in globalisation and how increased integration and innovation have given rise to new systemic instability.

The Financial Crisis and Global Governance

Despite increasing capital market liberalisation since the Second World War, by the turn of the 21st century governments had been convinced by new economic theory and lobbying groups that global finance required only 'light touch' regulation (Abdelal, 2007; Soros, 2008). Three major global institutions: the IMF, the Bank for International Settlements (BIS) and, following the Asian financial crisis of 1997, the Financial Stability Forum had responsibility for global financial stability, yet no binding international standards were codified to establish a multilateral understanding of financial transparency and accountability (Abdelal, 2007). The financial crisis can be described as a systemic failure that began due to the absence of a global rule-making authority to oversee global private financial institutions and processes.

Global regulation had a significant governance gap that allowed for regulatory arbitrage by private financial institutions. The regulatory systems in the US, UK and other G8 countries, as well as the Basel-based BIS, fell victim to regulatory capture by large international banks, which allowed these institutions to influence and lobby regulatory outcomes to their individual advantage, but to the detriment of systemic financial stability (Lall, 2009). Basel II regulations relied heavily on large banks' own capacities to evaluate their own risks via internal Value-at-Risk (VaR) models (S&P, 2008, pp. 48–112). Moreover, the BIS capital requirement focused on the individual risk management of each bank instead of the interactions of banks holding asset portfolios with high correlation of return. A study by Acharya (2009) illustrated that this resulted in banks optimising and minimising their own individual risks instead of taking into account the systemic effects of their actions. Basel II's governance gap of inadequate capital regulation also led to innovation designed to take advantage of and circumvent these rules. Regulations designed to ensure that banks held adequate capital failed to pre-empt the development of new means to transfer the liabilities associated with this capital through new derivative instruments, namely credit swaps. By allowing banks the potential to offset and essentially outsource their risks with counterparties, and with misleading risk management models of their own, national and global institutions failed to envisage the situation where these counterparty risks would be sold on, not just once but hundreds if not thousands of times (Benink and Kaufman, 2008). Gross exposures escalated in a manner that bore no resemblance to the net exposures of the banks, with the ratio of financial company debt to GDP in the US increasing from 16 per cent to nearly 116 per cent between 1975 and 2007.³

The rise of credit derivatives forged a robust new network that increased in complexity because of its new nodes, pathways and high degree of connectivity (Shin, 2008). Connectivity in the global financial network grew more complex and dense than ever before, with nodes increasing 14-fold, and links between financial stocks becoming more frequent, increasing sixfold since 1985 (Haldane, 2009a). Haldane as well as Sui (2009) also found the global financial network had a long-tailed distribution, where only certain nodes and pathways were critical to the functioning and stability of global finance depending on their degree of connectivity and the nature of neighbouring nodes. These increases in interconnectivity contributed to robustness of the network by spreading risk through securitisation, but also rendered the system fragile to targeted attacks on its hub nodes, with the potential for risk amplification and contagion. It was ultimately the subprime crisis that triggered the financial crisis, but it was the underlying innovation, integration and interdependency of the global financial network that created fragility of the system. National regulators as well as global institutions such as

the IMF, BIS and the Financial Stability Forum failed to regulate financial activity because they simply did not understand the systemic nature of this threat.

The failure of financial regulators to appreciate the systemic nature of the risks was exacerbated and indeed informed by a new economic orthodoxy. Complacency about asset bubbles and the explosion of financial markets had been justified by a profession increasingly driven by narrow theoretical and quantitative constructs which were divorced from reality and sought to explain the markets as rational (Colander et al., 2009). The capture of economics by scholarly 'quants' mirrored the capture of bank balance sheets by 'quant' traders. As a result, during the expansion of the credit cycle from 2002 to 2007, risk management was based upon 'fundamental distortions in the macroeconomic underpinnings of some of the largest economies in the world' (Boorman, 2009, p. 128). Orthodox economists, many of whom were conflicted as they served as consultants and advisers to the US government and Wall Street, soothed concerns regarding regulatory and macroeconomic oversight. While macroeconomists rightly worried about the systemic implications of 'global imbalances' (as exemplified by excess consumption in the US and excess savings in China and some of the oil exporting countries) (Bernanke, 2005), there was virtually no focus on the nature of banking or the risks born of economic deregulation.

While global governance failed to implement strict regulation on private financial institutions, national governance in many nation states constantly pushed towards deregulation. Economic liberalisation in the US undermined the Glass-Steagall Act, and two landmark federal statutes substantially deregulated loan products: the Depository Institutions Deregulation and Monetary Control Act of 1980 and the Alternative Mortgage Transaction Parity Act of 1982. Increasing deregulation shifted power in the financial markets towards private financial institutions (Crotty, 2009).

As financial markets opened up globally, competitiveness increased sharply. In order to compete in a global market where nation states are subject to global pricing activity, many firms shed their territorial-based commitments to secure new investments globally (Crotty, 2009; Soros, 2008). In the absence of a global rule-making authority, increased market competitiveness between nation states created a scenario where financial standards were increasingly lowered by playing regulators off one another.

As a result, governments fell victim to their own short-term thinking, as they sought to lower regulatory standards to reap the immediate benefits of employment and tax revenues. The determination of politicians, often extravagantly lobbied by bankers, to keep and increase financial services in London and New York led to a commitment to 'light touch' regulation between the leading centres, and an over-expansionary monetary policy (French et al., 2009). Policy makers were apparently convinced by arguments that the

future of their financial capitals and a significant share of their tax revenues required a reduction in regulatory burdens and red tape (Johnson, 2009). Policy makers also favoured less regulation because they believed regulation would constrain the innovation needed in financial markets to support further economic globalisation and stability (Espenilla, 2009). Above all, politicians and regulators drew comfort from the economists' consensus of 'the Great Moderation', which argued that the US economy had exhibited low volatility since the 1990s (Stock and Watson, 2002). The absence of regulation at the level of global governance allowed for deregulation at the level of national governance.

The implications of national deregulation and a tight global market led to a global financial network that Haldane (2009a) described as a 'monoculture'. For example, in the UK, the financial sector had grown 76 per cent between 1996 and 2006, outpacing all other sectors according to the National Statistics Economic and Labour Market Review. By 2008, over one-fifth of all UK employment was in the financial sector, which was contributing over £100 billion annually to UK economic growth and was responsible for 10 per cent of national GDP.⁴ As securitisation of subprime mortgages increased, governments became increasingly beholden to what was becoming a homogeneous source of employment and tax revenue. Consequently, national governance of financial institutions and processes became increasingly difficult as banks became more powerful lobbyists as the financial services industry grew increasingly profitable.

The lucrative innovation of credit swap derivatives also led to a global convergence of business strategy and a global race began for higher risk-adjusted rates of return (Acharya, 2009). Haldane (2009a) notes that pairwise correlations reached as high as 0.9 from 2004 to 2007, making the homogeneous global financial network susceptible to trigger events and feedback mechanisms. As risk materialised with the trigger of the subprime crisis, banks began to raise premiums, hoard liquidity and sell risky assets below value because they were unsure of their counterparties' exposures to risk, all of whom had the same business strategies (Brunnermeier and Pederson, 2009; Morris and Shin, 2008). 'Herd' behaviour and 'irrational exuberance' ultimately led to Shiller's early prediction of the burst of the real estate bubble and a 'worldwide recession' through feedback theory (Shiller, 2005).

Based on seminal work in economic governance (Keohane and Ostrom, 1995; Ostrom et al., 1994), it is possible to view the global financial system as a common-pool resource, whereby the financial crisis demonstrated a failure to govern sustainably the 'global financial commons'. Therefore, from the perspective of national governance, the underlying threat of systemic risk could be understood as a contemporary manifestation of Hardin's (1968) 'tragedy of the commons', since short-term gains for one jurisdiction

carry systemic risks for all. However, in terms of regulatory restrictions on financial innovation and monitoring interdependencies, international cooperation was cursory in nature. Since 2001 and the focus on the 'war on terror', it has principally been preoccupied with the establishment of global regulations on money laundering and illicit financial transfers. Although important, this new global regulatory focus obscured another significant systemic risk that arose at the level of the individual: the collective actions of what Clark et al. (2009) refer to as the 'individual financial actor' led to new and ignored systemic risks.

Circumvention of regulation was possible because of misaligned incentives at the level of the firm and individual financial actor. The incentives of traders operate to encourage them constantly to find ways to increase the volume of their trades, create ingenious new financial instruments and, because of the constraints posed by Basel, particularly to find new innovative trading strategies to offset risks (Haldane, 2009b). The innovation of credit default swap derivatives allowed firms to outsource their risks to counterparties and effectively decouple risk from responsibility. This led to moral hazard, which Baker and Moss (2009) argue occurs when people in control of taking risks are more inclined to take larger risks because they do not bear the cost of failure. As a result, individual actors had greater incentive to focus on network growth than network vulnerability, which has been shown to lead to systemic vulnerabilities in complex biological, technological and financial networks (Saavedra et al., 2008). Saavedra et al. explain that much of the focus to date has been on how robust networks are assembled, whereas a dynamic picture of network evolution and robustness requires equal emphasis on the consequences of different disassembly processes, and the vulnerability of networks to specific mechanisms such as asymmetric disassembly.

Schwarcz (2008) argues that hard law and strict rules are required to reduce systemic risk since there is a 'tragedy of the commons' where traders lack the incentive or regulatory framework needed to limit their risk taking. However, the generational gap between traders and regulators means that there is a significant skills mismatch between young innovative traders and the older regulators, many of whom do not have the knowledge to understand the complexity of new financial instruments or modelling. Youth and innovation, motivated by mesmerising bonuses, won over seniority and rules. The national and global regulators did not understand the complex underlying systemic risks festering under these new financial instruments, nor could they keep up with the pace of their innovation. As a result, the system was overwhelmed by innovation that sidestepped underwhelming regulation.

Individual traders also may not have understood the ramifications of their own complex innovations (Jervis, 1997). Modern behavioural economics stresses that there are limits to the extent to which people can understand

complex instruments (Shiller, 2009). In general, traders pragmatically legitimise their decisions based on classical economic models, such as the Efficient Market Hypothesis and Capital Asset Pricing Model to model how finance *should* work, not how it *does* work (MacKenzie, 2006). In many cases, as was the case with VaR models, these risk assessment models make major assumptions and simplifications that underestimate or fail to capture the complexity and systemic nature between local and global landscapes of finance (Danielsson, 2008). These traders, in misunderstanding systemic risk, might not necessarily have appreciated the cumulative effect of their individual actions, what Haldane (2009b) refers to as 'network externalities'. Moreover, even if they did understand the consequences of their actions, they would have been aware that they were operating within global and national regulations, which did not outlaw credit derivative swaps or related transactions. For individual traders, these were rational activities, even if the collective impact was powerfully destabilising.

The inability of national and global governance institutions to predict or regulate effectively the systemic risks underlying the financial crisis reflected a profound misunderstanding of the complex and fragile dynamics of the global financial system. As the global financial system became more complex, global institutions and economic analysis failed to evolve at the same pace. Among the results was the systemic proliferation and permeation of what Warren Buffet predicted to be 'financial weapons of mass destruction' (Berkshire Hathaway, 2002).

4. Response to Systemic Risk of the Financial Crisis: The Failure of Modern Global Financial Institutions

The financial crisis has triggered what is considered to be the deepest global recession since the Great Depression (Reinhart and Rogoff, 2008), with worldwide losses estimated to reach well over US\$4 trillion by 2010.⁵ The need and opportunity for change in national and global financial policy setting has never been more urgent, especially the need for increased international cooperation in global economic governance (Gros et al., 2009). Yet the current global response to the financial crisis has been inadequate, as it continues to fail to appreciate or deal with the underlying forces of systemic risk identified above.

The short-term response has been to inject over US\$9 trillion into the global economy via economic stimulus packages, guarantees of bank deposits and taking over 'toxic' debt.⁶ These actions are likely to serve their purpose of providing much-needed oxygen to economies suffering from the coma induced by a credit freeze. The massive increase in government spending, however, will exacerbate national and global imbalances in the medium term, and urgently requires more transformative global action.

The response also has raised moral hazard as the biggest financial firms have absorbed their competitors and are now even more interconnected and too important to fail. Indeed, as the failure of large banks in the future would lead to a write down of taxpayers' bailout funds, they are more likely to be saved by federal rescues. This could perpetuate or even increase excessive risk taking and the possibility of more severe systemic risks in the future by encouraging loss control instead of prevention (Baker and Moss, 2009). The assurance of federal rescue also reinforces the view that economic policy orthodoxy need not fundamentally change, as indeed has been seen after the recent financial crisis (Wolf, 2009a).

National policy change in the US also reflects a continued lack of understanding of systemic risk. Instead of consolidating regulation, the government has proposed the formation of a Financial Oversight Council and an additional council, which will overlay two additional regulatory bodies atop what already is an entangled web of US regulators (Luce, 2009). This will not only decrease the efficiency of national systems of regulation; it will also undermine effective international coordination and global policy setting by increasing complexity.

The crisis served to accelerate the evolution of the G8 towards a G20, in what has been considered by many as a major step towards a new international financial architecture and reformed global economic governance regime (Schmidt et al., 2009). The G20, however, remains tentative and without administrative capacity or executive authority, while the original G8 continues to attempt to assert its leadership in all matters other than finance. To date, the G20 has failed to get to the roots of the crisis or to go beyond its coordinated fiscal stimulus and focus on corporate bonuses to develop a deeper and more lasting resolution. Indeed, at the latest September 2009 summit, the G20 Leaders' Statement offered little more than vague pledges to 'raise capital standards' and 'discourage excessive leverage' (Pittsburgh Summit, 2009). As an informal institution, the G20 facilitates open dialogues on 'better global governance' (Schmidt et al., 2009), but as Stiglitz (2008, p. 319) highlights, 'being invited for lunch is not good enough'. Furthermore, while the G20 is hailed above all else to be a more inclusive form of global governance, as the article by Woods in this issue identifies, in practice it remains little more than a tentative first step without multilateral legitimacy or authority (Gros et al., 2009). Without the institutional structure to manage diverse interpretations of the crisis, collective action problems could derail G20 progress, where increased interdependency may lead to increased friction rather than collaboration (Schmidt et al., 2009). A key consideration is how to expand representation without compromising efficiency, with some arguing that 20 actors are already too many (Wolf, 2008). Developing global governance systems that are representative and legitimate as well as effective in managing systemic risks is an extraordinary challenge. As Simon (1962, p. 476) notes,

in complex systems 'there are generally limits on the simultaneous interaction of large numbers of subsystems'.

Global governance requires a radical structural change of the existing institutions tasked with systemic risk management in finance. The G20 has given the IMF added responsibilities to step up its supervision and new funds to pump into countries suffering the results of the crisis. However, in a world where economic globalisation has outpaced political globalisation (Stiglitz, 2008), even the best equipped of global financial institutions, like the IMF, will struggle to govern effectively because they cannot evolve rapidly enough to manage systemic risks. The Financial Stability Forum has been renamed the Financial Stability Board, but it still has only a handful of staff and no executive authority or inspectorate, let alone sanction against countries that ignore it, as the US has done. At the same time, the proposed reforms of Basel II regulation appear equally inadequate, with powerful banking lobbies foreclosing any possibility of a fundamentally reformed regulatory response (Lall, 2009). Instead, regulatory progress has focused on increasing market risk capital charges, reducing the possibility of 'resecuritisation' and increasing oversight of portfolio risk in individual banks. By ignoring interbank relationships and by leaving banks' internal ratings and proprietary risk assessment models intact, Basel Committee reforms could exacerbate the probability of systemic risk in the future (Acharya, 2009).

A fundamental regulatory shift is nowhere in sight and no international supervisory body has done more than make vague recommendations about the radical structural step changes needed. Instead, institutionally rigid national and global economic governance regimes aim incrementally to tighten regulation to discourage complexity. Shiller (2009) notes that we should take the opportunity of the crisis to promote innovation-enhancing financial regulation instead of stifling innovation through misdirected regulatory overkill. He describes how regulatory agencies should embrace the robustness offered by complexity, and talk to innovators in order to contribute to the complex creative process and reduce system fragility. Although this is intellectually attractive, in practice it is likely to prove impractical and could lead to further instability. In a world of regulatory arbitrage, where the traders have incentives to remain one step ahead of the authorities, the key question is *whether* and *how* innovation should be curtailed. Innovation provides short-term gains, but if the longer-term costs in terms of systemic failures undermine these gains and are particularly devastating for the poorer members of society, then there may well be reasons to limit at the national and global scale the use of new financial instruments and to return to a world of segmented and less globally integrated finance and banking. The balance that must be struck between robustness and fragility should be central to the institutional response to the new realities of systemic risk.

5. Lessons from the Financial Crisis as a Systemic Failure

Lesson 1: With robustness comes fragility through network complexity and homogeneity.

System fragility stemmed from governance gaps at the global, national and individual level. The fragmented surveillance system created a space within which regulatory arbitrage could grow out of control of regulators (and most traders) who did not properly understand the systemic vulnerabilities caused by increased complexity and homogeneity. The financial crisis emphasises the need to adapt our fundamental understanding of economic networks to include the systemic complexities characteristic of the new 21st-century networks (Schweitzer et al., 2009). Understanding the topological robustness and complexity of a network depends on the dynamics of how these systems are formed and will fall apart, their assembly and disassembly processes (Saavedra et al., 2008). This involves an understanding that nodes cannot be analysed in an additive manner, nor can they be analysed isolated from their interactions with other nodes within the broader network (Jervis, 1997). Systemic analysis must examine nodes, pathways and the relationships between them since 'Catastrophic changes in the overall state of a system can ultimately derive from how it is organised – from feedback mechanisms within it, and from linkages that are latent and often unrecognised' (May et al., 2008, p. 893).

Lesson 2: Governance gaps within and between global, national and local institutions exacerbate systemic fragility.

The second lesson draws on the tension within and between levels of financial governance ranging from the global to the local. 'In many ways, the subprime crisis occurred because the global ignored the complexities of local' (Clark et al., 2009, p. 2). The global financial architecture of a fragmented surveillance system resulted in information asymmetry, where traders developed models that scored risk in a complex, poorly understood way which confused regulators and attracted global investors by 'eschewing local knowledge in favour of formula-based risk management on a global scale' (Clark et al., 2009, p. xv). Market prices therefore did not reflect the reality of the underlying risk and self-reinforcing tendencies of markets, in what Soros (2008) refers to as 'reflexivity'. In the absence of adequate global or national regulatory standards governing the intermediation process, the innovation and use of US collateralised debt obligations allowed local subprime mortgages to be repackaged and sold globally in an integrated financial system. The robustness born out of greater integration and connectivity of the global financial network also created great fragility in the network which facilitated contagion upwards

and downwards through the 'global local continuum' by a liquidity crisis (Clark et al., 2009).

These relationships between local and global forms of governance were largely ignored, the systemic consequences of which amplified a 'local crisis' into a systemic and 'global crisis'. Governance of the global financial system at all spatial scales must work together to coordinate and collaborate (Axelrod, 1997), because no level of governance is sufficient as an island of regulatory control. The high degree of integration and interconnectedness across the financial system calls not only for vertical regulation, but also horizontal regulation that looks between and across all spatial silos of governance.

Lesson 3: Rapid technological innovations enable systemic complexity and overwhelm regulation.

In Simon's (1962) seminal work on 'The Architecture of Complexity', he identifies organisational hierarchy as a recurring structural feature of complex systems. The term 'hierarchy', as used by Simon, describes an architectural arrangement whereby systems and their subsystems show similar patterns of connections at different scales, which may reduce some of the inherent complexity and unpredictability of highly connected systems. The financial crisis illustrated that globalisation has 'flattened' financial hierarchies through the growth and innovation of technologies, and that this greatly increased both the complexity and global scale of interconnectedness. This was facilitated by new technologies, which underpinned an escalation in system traffic and complexity, which was not understood by the users of the system.

The financial crisis could not have occurred without the scaled-up computing power that facilitated the innovation and transmission of sophisticated credit derivatives, automated underwriting and increasingly complex risk assessment models. Technological change via the acceleration of computer processing has greatly contributed to system fragility because microprocessors facilitate logistical chains, increase connectivity and facilitate the innovation of complex financial instruments, the underlying mathematical theories of which can be flawed, hard to understand and even more difficult to regulate (Colander et al., 2009). Danielsson (2008) argues that while statistical risk models are applicable to small frequent events, such as internal risk management, these models do not and cannot account for systemically important events. In retrospect, it is not surprising that both the traders and regulators had a poor understanding of the systemic risks of new financial instruments. This is because 'when interconnections are dense, it may be difficult to trace the impact of any change even after the fact, let alone predict it ahead of time, making the system complex and hard to control' (Jervis, 1997, p. 17).

These technologies also generate shortcuts between nodes in different parts of the network, which gives rise to

the 'small world' property by reducing average shortest path lengths between nodes (Watts and Strogatz, 1998). The 'small world' property of networks therefore has the potential to facilitate the spread of local risk into global risk. This was demonstrated in the financial crisis when the average path length of the financial network had decreased to fewer than 1.4 degrees of separation between nation states (Haldane, 2009a). Above all, these financial instruments contributed to the financial crisis because their rapid innovation outpaced the understanding of regulators and institutional responses.

Lesson 4: Deregulation and Just-In-Time management theory drive homogeneity and systemic fragility.

The fourth lesson emerges from new pressures and homogeneity in management incentives. The financial crisis demonstrated that deregulation and the advent of innovative new technologies led firms to mimic one another and become less diverse in the pursuit of investment return. What is less understood is the origin of this approach, which has been fundamentally driven by a shift in financial management theory. In recent decades, inventory management strategy and international accounting standards shifted towards the notion that in an integrated global economy no assets should lie idle and every penny should be leveraged capital, as reported to the market in quarterly results (Hutchins, 1999). This was evident in global financial systems leading up to the crisis, where excess liquidity or capital came to be regarded as a curse, so that innovative bankers sought ways to gain leverage even from capital reserved for regulatory purposes. As Jervis explains (1997, p. 19), eliminating stocks and reserves and 'tightening the connections between elements will increase efficiency when everything works smoothly but will spread any problems that arise'. The drive for returns on a quarterly basis and the quest to eliminate 'idle' capital increased vulnerability to systemic risk and once the crisis was triggered it greatly facilitated global contagion. This lesson is important to other industries, including manufacturing and services, where the widespread squeezing of stocks and tightening of supply chains has also created new vulnerabilities and system fragility as resilience to shocks or breakages in logistics systems has been concomitantly reduced. This is a concern in both the private and public sectors (and leads, for example, to hospitals reducing their stocks of oxygen and other vital products).

Lesson 5: Modern global financial institutions are inadequate in their response to systemic risk governance and cannot keep pace with innovation and increasing system complexity.

The international institutional framework for global finance is the best understood and most sophisticated of the global governance regimes (Kerwer, 2005). The unpredicted col-

lapse of the system has highlighted the vulnerability of even the most sophisticated institutions, as profound shortcomings in the governance system stemmed from a lack of understanding of systemic risk in the 21st century. The failure of the best-equipped global governance system, finance, has highlighted the scale and urgency of addressing this challenge.

6. Systemic Risk in the 21st Century: Applying Lessons from the Financial Crisis

Systemic Risks in the 21st Century

Many of the greatest challenges of the 21st century are not new. These include the elimination of poverty and disease, the avoidance of conflict and nuclear proliferation and the loss of biodiversity and natural resources. What *is* new is the nature of interdependence and complexity, as more integration and more people, combined with new technology, have led to increased interdependence and fragility and the creation of a global risk society. The financial crisis is only the first of the 21st-century systemic crises to manifest itself.

Among the most challenging of the other major systemic risks are: (1) modern pandemics, which can now be characterised as global systemic risks because of their ability to reach all corners of the world due to 'increasing multidimensional interconnectedness and integration' (Ingram, 2005, p. 522); (2) bioterrorism risks, which, as Persson and Savulescu (2008) outline, are likely to become increasingly systemic in the 21st century as the ability to produce biological, nuclear and other weapons of mass destruction becomes much easier, especially for nonstate actors, with increases in population density, urbanisation, technological innovation and connectivity, both physically and virtually; (3) the Internet, which is an apparently robust communications network, but has great fragility which presents significant global governance challenges (Albert et al. 2000); and (4) climate change, which was a silent tsunami that crept up on us and presents significant environmental, social and economic risks to humanity (Deere-Birkbeck, 2009; Stern, 2007).

Global Governance of Systemic Risks in the 21st Century

Faced with pandemics, security crises, threats of global terrorism and crime, climate change and many other looming threats, new approaches to global governance are required. This does not mean that nation-state governance will become less relevant, as has been argued in the past (see extreme positions between Ohmae, 1995 and Yeung, 1998); rather, that 'internationalisation of the state' (Glassman, 1999, p. 669) will require effective governance at both the national and global scale. In the 21st century, the stakes for getting global governance right have never been so high or so urgent.

The omens, however, are not good. If past decades provide a guide, new problems will be thrown at old and outdated institutions. Global finance is the best understood and most institutionally developed of the global governance regimes, yet these institutions failed to predict, prevent or understand the endemic systemic risks in the system, and they have yet to elicit the structural changes needed to manage proactively future systemic risks. It may be that without the well-established institutional architecture of international economic regimes, other challenges are even *more* susceptible to systemic risks than that of global finance. This is because in comparison to global finance, global institutions understand much less about other complex, interdependent and emerging systemic risks facing the 21st century.

While 'systemic risks ultimately require systemic responses' (Clark et al., 2009, p. 41), the IMF, the United Nations, the World Bank and others are already overloaded and cannot politically deliver on their mushrooming mandates. 'The work of the institutions has expanded yet faster than their efforts to be (and be seen as) more accountable' (Woods and Narlikar, 2001, p. 582).

The pace and extent of economic and technological innovation will continue to outpace regulation, and even the best-equipped institutions will struggle to adapt to the rapidly evolving complexity of systemic risks. It is not surprising that these global institutions have suffered from a decline in legitimacy (Stiglitz, 2008), as they do not have the authority, the capacity or sufficient legitimacy to deliver on the enormous expectations placed on them, not least in systemic risk management.

In response to the systemic failure of the global financial crisis, some suggest that tightened regulations and incremental reform will aim to reduce the size, complexity and interconnectedness of private financial institutions, in what Wolf calls 'deglobalisation' (Wolf, 2009b; Shiller, 2009). Although a reversal of the global economy may be possible, many of the other systemic risks in the 21st century are decidedly irreversible, complex and interdependent. Global governance here will remain crucial. Many of these systemic risks will require global coordination and collaboration, as any action taken by one country, or even a few, is likely to prove ineffective (Axelrod, 1997). As the number of both state and nonstate actors increases, so too will multiplicity of interests; collective action problems will surely be inevitable and contribute to systemic fragility. It also cannot be assumed that all actors will be willing participants, as the potential short-term returns for evasion can greatly exceed the cost of long-term cooperation. A lack of political will has already been seen at the macro level, with the failure of international climate change agreements such as Kyoto, the inability to come to a global consensus on the regulation of weapons of mass destruction, and the ongoing international debate on stem cell research (Martin, 2006).

Despite these enormous challenges, because global governance is necessary in the 21st century, global policy reform



is needed to improve it and to ensure that economic globalisation is maintained in the future (Stiglitz, 2008). The majority of global governance reform has historically focused on more democratic governance in voting and representation (Woods and Narlikar, 2001). While we recognise their importance, these reforms would not have predicted or resulted in better responses to the systemic risks that were triggered, amplified and propagated in the case of the financial crisis. Governance reform of existing global institutions is both essential and overdue; however, these discussions should not crowd out more fundamental questions regarding the nature of 21st-century global challenges. Reforms should not act as a substitute for the deep structural changes needed in global institutions to address the underlying forces that render the global community vulnerable to systemic risks.

Conclusions

Recent decades have brought the greatest benefits history has known. At the same time, globalisation, population and economic growth, as well as technological progress have created a world where growing interdependency and complexity have led to the emergence of new systemic risks. The financial crisis characterises the nature of a global systemic crisis in the 21st century. It has demonstrated that increasing linkages, technical innovation and management changes have increased both the robustness and fragility of the global financial network. The shortcomings of financial governance within and between all spatial scales, from local to global, as well as the inadequacy of global financial institutions to pre-empt or adequately respond to the crisis, reflected a failure to understand or address the underlying systemic risks.

Systemic risks do not only plague global finance. The financial crisis highlights the real threat of systemic risks in other areas and exposes the alarmingly profound shortcomings of modern global institutions. Neither their present institutional structures, nor their planned reforms, meet the test of addressing new global systemic risks in the 21st century. While the need for global governance is indisputable and radical structural changes are clearly necessary, the very nature of systemic risk and the pace of innovation have made it impossible for even the best equipped of the global institutions, such as the IMF and BIS, to govern these challenges effectively.

Unfortunately, the devastating consequences of the financial crisis have not been capitalised upon. The crisis failed to transmit into action and kick-start the fundamental structural changes necessary for global institutions effectively to govern future systemic risks. Nevertheless, growing pressure for more inclusive, secure and sustainable globalisation is likely to add to the impetus for new patterns, institutions and processes in global governance that address the need for proactive global systemic risk

management. The question is not *if* structural change will take place in global governance, but *when* and at *what cost*?

In this article we have not sought to provide the answers. Our aim has been to identify the nature of our increasingly connected and ineptly managed global village. We hope it may prompt further research and debate and through this a more rapid evolution of global governance.

Notes

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1. UN World Urbanization Prospects, 2005.
2. BIS OTC Derivatives Market Activity, 2008.
3. US Federal Reserve, 2007.
4. NSELM, 2008.
5. IMF World Economic Outlook: Crisis and Recovery, 2009.
6. IMF Global Financial Stability Report, 2009.

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