

Contributing factors to the emergence of risk in financial markets and implications for risk governance¹

Michel G. Maila

Introduction and overview

The purpose of this brief paper is to test and validate the concepts outlined in IRGC's Report with specific reference to emerging risks in financial markets. The paper will focus on human sources of emerging risk, as the impact of natural sources of risk on financial markets is generally well-understood and the resulting exposures have been effectively contained to-date thanks to a wide range of insurance and other risk-mitigation mechanisms. Within the category of human sources of risk, both unintended risks (where the adverse outcome is not intended to occur or is an externality to some other action) and intentional risks (such as fraud or theft) are relevant for financial transactions and markets.

With respect to contributing factors to risk emergence, the most relevant ones for financial transactions and markets are information asymmetries, technological advances (financial product innovation), social dynamics, (globalization, attitudes toward risk), conflicts about interests (competing economic interests) and varying susceptibilities to risk. All of these factors operate in a context of a very complex, global financial system.

In addition to validating the main concepts proposed by IRGC, the paper highlights a few implications of the analysis for risk governance. It also offers one specific suggestion, that of introducing an overarching concept of sound risk governance as alignment of all relevant stakeholders around an acceptable risk profile.

The potential implications of such an approach to addressing contributing factors to emerging risks are briefly illustrated for further consideration and research.

I. Contributing factors to emerging risks in financial markets

Self-hazardous behaviour (where the same person who generates the risk bears the risk), co-generated risks (where two or more agents engage in decision-making that creates risk incurred by at least one of them) and external risks (where the risk generator has no formal relationship with the risk bearer) arise frequently in financial transactions between individuals and financial institutions on the one hand as well as between institutions in financial markets on the other hand. For ease of reference and brevity, "transaction" will denote the individual versus institutional context and "interaction" will refer to the institution versus other institutions context.

a) Information asymmetries and varying susceptibilities to risk

The use of financial products and services requires a modicum of knowledge and familiarity with their costs, benefits and increasingly some basic understanding of the potential risks associated

¹ This paper accompanies the IRGC report "The Emergence of Risks: Contributing Factors" and is part of phase 1 of IRGC's project on Emerging Risks. More information can be found online at <http://irgc.org/Project-Overview.219.html>

with them. This is the case even for basic transaction products such as bank accounts or debit and credit cards, let alone for more complex products such as mortgages, investment portfolios, retirement plans and insurance policies. Yet, despite the progress achieved in enhancing financial literacy over the past couple of decades, there remains an uneven playing field in terms of significant **information asymmetries** between the suppliers of many financial products and the individual consumers who buy and use them. Clearly, this is not a new or surprising phenomenon and most financial institutions endeavour on a regular basis to minimise these information asymmetries in a variety of ways including explicitly assessing with clients the suitability of particular products to their specific circumstances. When conducted properly, suitability testing covers not only the knowledge component but it also addresses **varying susceptibilities** to potentially adverse outcomes and the willingness and capacity of the client to tolerate and cope with these outcomes. In common parlance, such tests help classify potential clients into several categories ranging at one extreme from “widows & orphans” (relatively ill-informed and typically risk averse) to the other extreme, namely “professional investors” (well-informed and generally ready, willing and able to take significant risk).

Despite these efforts, however, the recent sub-prime mortgage crisis illustrates the significant adverse consequences of the triple nexus from which this particular risk emerged, namely:

- information asymmetry between borrowers on the one hand and mortgage brokers and providers on the other hand,
- insufficient knowledge on the part of many borrowers about key features of the mortgage product
- and, in many cases, a higher than anticipated degree of susceptibility to re-pricing/refinancing risk at mortgage renewal time.

While the bulk of these outcomes falls within the category of unintended risks (a combination of the self-hazardous behaviour, co-generated and external risks described above), there is evidence that some of these outcomes were the result of deliberate fraud on the part of some mortgage providers or brokers (contributing factor # 12, malicious attacks > motives for such fraud are most often rooted in greed, but attempts to cause others financial loss may also be due to envy, revenge or hatred). The mechanisms involved in these cases of deception/fraud vary but they generally involve some combination of the following elements: failure to disclose all relevant terms/conditions (thus exacerbating natural information asymmetries), exploiting knowledge gaps and severely understating or ignoring susceptibility to re-financing and other risks.

The same fundamental nexus observed in the individual financial transaction context has also been evident as a contributing factor to emerging risk in the institutional financial interaction setting. A recent example of information asymmetries and knowledge variability at work relates to the evolution of securitised products over the past few years, both within and across national borders. In this context, the parties involved in a typical securitisation include several different institutions: originators/issuers of securities, underwriters who structure and package them, rating agencies which provide an opinion on the risk associated with these securities, intermediaries who sell them, end-investors who buy them to hold in their investment portfolios and other financial intermediaries who specialise in trading in and out of them for profit. The significant knowledge gaps and the extensive variability of access to accurate information across this lengthy chain of financial intermediation proved to be a major contributor to the recent demise of this asset class (particularly its cross-border component) after several years of impressive growth and apparent profitability.

Here again, this is mostly a case of unintended emerging risk. However, there have also been several well-publicised cases of deliberate fraud by hedge funds which succeeded in defrauding even institutional counterparties and professional investors.

b) Moral hazard and asymmetric incentive structures

The issue of moral hazard in financial behaviour and decision-making is a well-documented and extensively researched phenomenon. The insurance and re-insurance industries have devoted considerable resources over several decades to minimise the incidence of moral hazard through a variety of mechanisms designed to contain its impact as a driver of emerging risk. In contrast, moral hazard has continued to generate significant co-generated and external risks in the investment banking and asset management industry. This has become quite evident after the financial crisis of 2007 and 2008. While these risks materialise in a variety of ways (e.g. as unexpected losses on highly-rated collateralised debt obligations), they tend to share the following underlying dynamics:

- incentive structures are not symmetrical with respect to gain or loss for the party engaged in a given financial transaction or interaction (e.g. expected gain is far larger than potential loss)
- financial behaviour by individuals and/or institutions is accordingly distorted and typically skewed toward a higher risk appetite than would otherwise be the case
- as a consequence, additional external risks are generated and these are transferred, often implicitly, to third parties often without their full knowledge or explicit consent.

The risk transfer can be intended or unintended, but the ease with which it shifts from the risk generators to the ultimate risk bearers is primarily a function of the contributing factors identified under paragraph a. above and of system complexity.

c) System complexity

The report emphasised the importance of the systems perspective and of recognising complexity when considering the factors that contribute to the amplification or attenuation of emerging risks. In the financial markets context, 'system' denotes:

- the network of financial transactions and interactions involving individuals and institutions operating within and across national borders
- the explicit or formal legal, regulatory and governance framework around these financial transactions and interactions
- and the implicit, usually informal "rules of the game" espoused by policy-makers which influence the expectations and hence the financial behaviour of individuals and institutions.

System complexity relates not only to each of the three components of the system but also to the interdependence between them. To illustrate, one could argue that the scale and connectivity of an increasingly global financial network can provide a degree of resilience by spreading and dampening shocks across a larger market space. However, the system as a whole can nevertheless become fragile (and prone to major failure) if:

- there are gaps in the explicit cross-border regulatory framework governing the network's operation following a particular type of shock, or
- if there is a major difference between what the authorities were expected to do in reaction to that shock pursuant to the formal regulatory framework in place and the likely reaction of policy-makers as individual investors and financial institutions now anticipate it to be.

The potential effect of such gaps and disconnects could be to introduce a significant new source of uncertainty about the stability of the system, with financial market participants wondering whether or not they are facing an underlying structural shift to a new systemic regime.

It may accordingly prove analytically fruitful to think of the impact of system complexity along two distinct dimensions:

- complexity within a system viewed as a stationary regime
- versus complexity induced by expectations of the system potentially undergoing a regime shift.

d) Unintended consequences of public policy

Public policy has historically shaped the bulk of the infrastructure of the modern financial system including payment, settlement and intermediation services. In addition, public policy (broadly defined to encompass monetary, fiscal and regulatory interventions) continues to exert a multi-faceted impact on financial transactions and financial interactions, both in the domestic and the international arenas. In each country, central bankers, finance ministers and financial regulators are charged with the primary responsibility to maintain the safety and soundness of the domestic financial system. As a result, their interventions (actual and potential) in the markets, their expert judgments (explicitly stated or inferred) about market trends and even their tacit endorsement of particular financial practices can and regularly do have a significant impact on the expectations and behaviour of financial market participants.

In most cases, the well-intentioned policy stance of central bankers and financial regulators is generally effective in facilitating the achievement of public policy objectives. However, in the presence of information asymmetries, moral hazard and unappreciated system complexity (particularly in a globalised context), public policy can also on occasion have adverse, unintended consequences which can exacerbate the de-stabilising impact of other risk drivers, especially across borders. A recent case in point is the period from about 2002 until late 2006 where many financial market participants came to share, alongside with prominent policy-makers, the following set of related beliefs about the state of the financial system:

- the financial system is inherently stable, robust and resilient (hence the frequent references to the “era of great moderation”)
- modern financial instruments (e.g. securitisation products and credit derivatives) have succeeded in diversifying and dispersing risk to a significant extent; accordingly, shocks are expected to have effects of less than proportional magnitude
- the complexity and opacity of many financial products and, correspondingly, of the poorly-understood interactions between the financial institutions who transact in them, are a benign side effect of innovation, an acceptable by-product in view of the resulting efficiency and productivity benefits.
- ample and readily available credit can be taken for granted in the financial system since, in a downside stress scenario, the monetary authorities will be providing liquidity at a reasonably low cost (“the Greenspan put”)
- in a worst case, systemic crisis scenario, large financial institutions, especially those that are too big or too interconnected to be allowed to fail, are likely to be rescued by the authorities.

Some of these beliefs were borne out in the course of the financial crisis which started in 2007 and others have not been, at least to-date. One relevant lesson to learn from this episode is that pervasive information asymmetries and unmitigated moral hazard in a complex, poorly-understood system can, in combination, become major contributing factors to the emergence of risk, particularly when the public policy stance is widely perceived as accommodating or complacent.

Another lesson is that the unintended risk transfer to taxpayers can extend beyond national borders e.g. taxpayers in Iceland now face a significant burden following the collapse of the

banking system in their country as a result of a risk (e.g. US mortgage-backed securities) which emerged from outside their borders.

Such outcomes arising at the tail end of a long cross-border chain of events can appear counterintuitive and disproportional, but they illustrate vividly “the difficulty of identifying and quantifying causal links between a multitude of potential causal agents and specific observed effects” (IRGC’s definition of complexity). In the same vein as the story connecting a hurricane to the flapping of a butterfly’s wings, is it implausible that the imprudent sub-prime mortgages offered to less than creditworthy borrowers in California and Florida circa 2005 could have been a contributing factor to the losses incurred in Iceland’s banking system in 2008?

II. Main amplifiers and attenuators of emerging risks in financial markets

a) Risk amplifiers

- Unrecognised concentrations and interdependencies

Most financial institutions (especially major insurance and reinsurance companies) realise that “hidden concentrations” are the Achilles’ heel which can severely undermine the sustainability of their business model. Undetected accumulations of similar (or highly positively correlated) exposures can in the extreme prove fatal in a business where it is critical to measure risk correctly, price for it accordingly and ensure that pricing for risk remains actuarially fair over time. Clearly, this is easier said than done within each insurance or banking institution, particularly in an environment characterised by:

- a fast pace of product innovation and diffusion of new products
- increasing customisation of financial products and services (which typically create complex embedded options)
- high and variable volatility in market values
- and the proliferation of hedging instruments which help in mitigating some measurable risk but often at the cost of incurring other indirect or contingent exposures which are far harder to measure.

The task facing central bankers and financial regulators is even more difficult since it involves probing for unrecognised concentrations and interdependencies within the system as well as at the level of each one of the systemically-important institutions. The collective failures of financial institutions observed over the past couple of years vary in terms of the particular types of asset concentrations, liability mismatches or off-balance sheet exposures which went undetected until a specific risk emerged. However the underlying amplification mechanism is a common one: an initial, seemingly minor shock to the visible tip of the iceberg above the surface is transmitted to the much larger, heretofore invisible mass of the iceberg below the surface; this results in unexpectedly large adverse impacts which appear *prima facie* out of proportion to the initial shock. However, such impacts can often be rationalised *ex post* once the scale of the exposure concentration and the transmission mechanism connecting the dependencies become apparent. Early warning systems focused on this particular amplifier can help mitigate the large chance that the risks will materialize with maximum impact.

- Length and opacity of intermediation chains

A simple example of a short and transparent financial intermediation chain is an individual client making a small cash deposit into her account at her home branch through a bank teller. The number of parties to that transaction is small, only two; the risks are minimised (the client’s

identity is verified, the cash is counted twice and a receipt is issued); the time interval between the intended outcome of the transaction and its actual outcome is short; there is no ambiguity or uncertainty on the part of either party as to the nature of the transaction or its finality once it has been consummated.

In contrast, an individual investor in Iceland buying from his broker a highly-rated mortgage-backed security, backed by a pool of several thousands of US sub-prime mortgages originated a few years earlier finds himself at the tail end of a lengthy and opaque intermediation chain. The number of parties in the chain is large (spanning at least two countries and comprising brokers, originators, investment bankers, underwriters, rating agencies and financial advisors); there is little visibility into the bona fides of most of these parties beyond the one closest to the end - investor; and there is implicit reliance on the expertise assumed to be embedded in the chain.

More generally, the opacity of an intermediation chain, which typically correlates positively with its length, can act as an amplifier of external and co-generated risks. There are several factors driving this amplification effect. The larger the chain, the more likely that:

- relevant information is degraded along the way, and the more so with the passage of time
- reliance is placed on the parties upstream for due diligence
- incentives emerge to shift risk to the parties downstream
- the weakest link remains undetected, thus undermining the resilience of the whole chain.

As a result, an emerging risk is likely to be amplified to the point that the impact on the residual risk bearer at the tail end of a long chain of financial intermediation can be far greater than would be the case with a shorter and more transparent one.

- **Cycles in risk appetite and risk aversion**

The history of financial markets is replete with alternating episodes where either greed or fear on the part of individuals and institutions dominates behaviour for a considerable period of time. The resulting “boom and bust” pattern in asset values has been well documented and specific instances of a bubble followed by a crash are usually amenable to sensible rationalisation *ex post* on a case by case basis. The more general point however is that attitudes toward risk or risk cultures in general are critical to understanding the path taken by emerging risks. In the financial markets context for example, the timing of a particular shock can be a critical determinant of the severity of its ultimate impact depending on whether optimism prevails and risk appetite is high at the time or, alternatively, pessimism is rampant and risk aversion dominates. The resulting amplification effect in one direction or the other can be quite significant, although its full impact may not become apparent until such time as the risk culture pendulum has started to swing towards the other extreme.

Along the lines suggested in the IRGC report, it may thus prove useful to view risk culture shifts not only as risk amplifiers but also as signals of actual or potential tipping points in the system. Interpreting the messages conveyed by changes in risk attitudes is a very difficult task. However, within the context of any early warning system, the following types of questions have to be addressed by policy makers and managers:

- are observed shifts in risk appetite just a manifestation of normal volatility within a stationary regime?
- are they a symptom of emerging uncertainty about the rules of the game?
- or are they leading indicators of an impending systemic change to a new underlying regime i.e. potentially a major discontinuity?

b) Risk attenuators

- Competition as a source of resilience

It is an axiom in economics that market competition is a major driver of system efficiency and social welfare. For the purposes of this paper, it is useful to focus more specifically on the potential dampening effects that competition in financial markets can exert on emerging risk. Such effects tend to operate indirectly by countering the impact of some of the key contributing factors and amplifiers outlined in the previous section. Thus, one would expect that the greater the degree of competition in the supply of financial products and services, *ceteris paribus*:

- the fewer the information asymmetries,
- the smaller the degree of “too big to fail” moral hazard
- and the smaller the unrecognised concentrations at the institutional level.

While competition is clearly not a panacea at the systemic level, its potential attenuation effects extend beyond the number and relative size of institutions operating in a particular financial market. For example, compared to an oligopoly situation, competitive markets are likely to yield smaller spreads between “bid” and “offer” levels as well as market-clearing prices that are more accurate signals of efficient resource allocation within the economy.

As a result, incentive structures should exhibit less asymmetry than would otherwise be the case and thus smaller distortions and risk amplification effects should arise within the system.

Another transmission mechanism for the attenuating impact of competition on emerging risk is the superior level of liquidity it tends to create in financial markets. In this context, liquidity refers to the ability of individuals and institutions to consummate financial transactions and interactions, particularly at a time of stress e.g., when risk cultures may be shifting. Oligopolistic financial markets have been known to “dry up” or “freeze” when a new cycle of risk aversion is looming, such that both the number and average size of transactions and interactions decrease, often dramatically. In contrast, one would expect strong competition to induce fewer and lower-severity liquidity disruptions. Accordingly, the backlog of unfulfilled demand in the illiquid market as well as the resulting build-up in pent-up pressure within the financial system as a whole should both be correspondingly less significant when there are strong competitive forces at work.

- Buffers and circuit-breakers (see contributing factor #2, Loss of safety margins)

In general a buffer acts a shock-absorber so that the virulence of the shock downstream the transmission chain (post-buffer), is lower than that upstream (pre-buffer). A good example of a risk-attenuating buffer in the financial context is the equity capital of banking institutions. The formal rules of the game in banking dictate that a bank’s shareholders bear the residual risk associated with unexpected losses arising from that institution’s activities (expected losses are meant to be recovered from the interest margins charged on lending and from fees/spreads levied in non-lending activities).

Both bank management and supervisory/regulatory authorities accordingly have a keen interest in ensuring that the equity capital available to absorb unexpected losses is adequate in relation to two sets of risks:

- those that the bank knowingly assumes in its various transactions with individual clients and interactions with other institutions, and
- emerging risks which may otherwise arise.

The recent financial crisis illustrates that neither category of risk factors was sufficiently well-understood, let alone properly managed. Aside from the massive human consequences of the

crisis, this outcome is particularly disappointing given the significant efforts expended by both regulators and the industry since the 1980's on risk-based capital adequacy standards, both at the national and international levels. While a full post-mortem analysis of this episode remains premature, a few aspects of relevance to this paper are readily apparent:

- the quantum (and quality) of the equity capital buffers in place proved to be insufficient for them to play their intended attenuating role in many national jurisdictions. This was primarily as a combined result of the risk drivers and amplifiers noted in the previous sections but also as a result of the unintended pro-cyclicality of capital adequacy standards in tandem with evolving accounting rules
- emerging risks had migrated, while seemingly mutating in chameleon-like fashion, from the highly-regulated sectors of the financial system (e.g. banks) to the less-regulated ones (e.g. securitised products and credit derivatives), the so-called “shadow” system involving non-banks as well as banks
- the unrecognised interdependencies and feedback loops between these two sub-systems overwhelmed the capacity of managers and public officials to respond in a timely and orderly manner to a suddenly unfamiliar environment where the formal rules of the game no longer applied.

Circuit-breakers operate differently than buffers as a potential attenuator of emerging risk. These mechanisms (also known as firewalls) are intended to drive a wedge, under certain circumstances, between one or more sub-systems so as to disconnect them from each other, thus preventing the transmission of emerging risk to the insulated sub-system. A good example of an effective circuit-breaker in the financial markets context is the “do not break the buck” rule in the US money market mutual funds industry.

This refers to the requirement that on a daily basis the aggregate mark to market value of fund assets not fall below par (one dollar invested in the fund should at all times remain worth at least one dollar). Fund managers accordingly invest in safe, low-volatility assets which most easily enable compliance with that rule, and have correspondingly low rates of return. In the course of the financial crisis of 2007/2008, a few money market mutual funds did “break the buck” but the circuit-breaker worked in the sense that several thousands of them were by and large well-insulated from a significant emerging risk. In contrast, emerging risk was clearly not attenuated in most other segments of the asset management industry (such as hedge funds and fixed income or equity portfolios) where investors incurred massive unexpected losses. This example illustrates that circuit-breakers do not enable attenuation of emerging risk for the system as a whole, unlike buffers which have the potential to do so.

III. Implications for risk governance

What are the main, broad implications of this analysis for risk governance?

One is readily apparent from the preceding section on buffers, namely that it is a crucial and non-trivial matter to define what the relevant system is for purposes of assessing the effectiveness of potential risk attenuators. For example, policy-makers and regulators had long been focussed on the sufficiency of aggregate equity capital in the banking system as a whole but the relevant system turned out to be the broader financial one.

A second implication is that it is critical to put in place in advance appropriate legal authorities and resolution regimes to deal with the consequences of buffer failures if one is to minimise the likelihood of unintended risk transfers. For instance, a number of large, systemically-important financial institutions with insufficient equity capital recently became wards of the state primarily as

a result of the absence of enabling authority to unwind them or the lack of a resolution regime for the orderly disposition of their assets, liabilities and contingent exposures to viable third parties.

A third implication is that seeking to mitigate risk amplifiers and enhance risk attenuators within a complex system may itself be subject to the law of unintended consequences and thus fail to produce the desired effects with respect to the emergence and impact of risk. Even a seemingly straightforward policy stance such as fostering greater competition may not yield enhanced system resilience, at least in the short term, to the extent that the entry of new competitors itself triggers unanticipated reactions within that market segment or in related ones and, as a result, new or mutating risks emerge.

A fourth implication for further research is to explore whether the emergence of risk is affected by actual or perceived gaps between the informal rules of the game prevailing at a given point in time and the formal ones which typically define the structural regime within which a system is meant to operate. In the event that such gaps are significant, could emerging risk act as a catalyst which crystallises and exacerbates pre-existing doubts about the stability of the regime and hasten a turbulent transition to a new one?

A fifth and broader implication is that a silo-based approach consisting of tackling specific contributing factors to emerging risk in isolation is unlikely to prove a workable basis for sound risk governance practices. Instead, it may be more useful to view emerging risks in terms of their potential contribution to the overall risk profile of any given system i.e. their impact on the range and scale of potential adverse consequences facing the system. To illustrate, consider the myriad of identifiable and emerging risks which impinge on the overall risk profile associated with air travel and the numerous safety and redundancy features which have been introduced over decades to make that overall risk profile acceptable enough for people to board an airplane.

As the air travel analogy implies, the process which eventually led to an acceptable risk profile in that context started with the delineation of what an unacceptable one might look like, namely a high probability of the adverse event occurring (airplane crash) combined with the high-severity consequence of that event (low survival rate). While technological progress and safety regulations succeeded in bringing the risk profile down to an acceptable level, this was achieved in the case of air travel by focussing relatively more on the probability component than on the severity component, at least when compared to car travel where there is tolerance for a higher probability of a crash given the relatively higher survival rate post-crash.

The broader point suggested here is that the notion of an acceptable risk profile for a system may be a useful organising principle for risk governance purposes. Achieving and maintaining over time the alignment of multiple stakeholders around a common vision of an acceptable risk profile may serve as a useful overarching objective for sound governance. Delineating such a profile on a case by case basis will require common agreement on specific answers to the following questions:

- which type of crisis and of what order of magnitude is the system designed or targeted to survive?
- what are the relative weights of the probability and severity components as determinants of risk tolerance?
- how robust and resilient does a given system need to be for the combined and cumulative impact of emerging risks to be contained within the acceptable level of tolerance?

The process of aligning all relevant stakeholders around a common view of an acceptable risk profile for a system is also likely to involve difficult trade-offs across several relevant dimensions: system stability, efficiency, costs, benefits and their distribution, access, level of innovation and speed of evolution.

More generally, such an approach will also require a common vocabulary of risk, an agreed nomenclature of contributing factors to emerging risks as well as the development of a lingua franca for risk in order to facilitate communication and common understanding not only within practitioner groups but also with the public at large.