

**Tackling the “Too Big To Fail” conundrum:  
Integrating market and regulation**

By

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# Tackling the “Too Big To Fail” conundrum: Integrating market and regulation

Renato Maino<sup>§</sup>

## Abstract

Systemic risk is, by nature, unpredictable. Statistical models can fail to identify it. We need to maintain resource buffers as well as to implement better regulatory controls, and to improve managerial experience, and contingent strategies. International imbalances are nearly up to their sustainable limits, creating new systemic challenges. Some major financial institutions have recently assumed a critical position: they are highly interconnected and hard to replace in a panic. These institutions play key roles in the economy, such as providing market liquidity and pricing assets efficiently. Following deregulation, these institutions became “universal” groups covering a large range of financial markets and products. Internal conflicts of interest, opacity, and manipulated risk measures may arise. Regulation must change and new market instruments could exacerbate these internal problems. Here, we discuss some proposals to enhance the role of the Resolution Authorities (American and European laws are in the process of defining them). In particular, we examine a proposal for high-trigger contingent convertible bonds (HT CoCos), especially conceived for Systemically Important Financial Institutions – SIFIs (Calomiris and Herring, 2011). We propose that the bond conversion should be applied to all SIFIs’ HT CoCos as soon as one SIFI defaults. This solution could have many advantages: less costly recapitalization of the SIFIs’ system, more level playing field in the financial industry, good incentives to shareholders and supervisors to react promptly to potential systemic crisis, introducing breaks in SIFIs’ market values correlation (and with Sovereigns, too). We also provide a quantification of the potential market for such instruments.

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## Introduction

History is strewn with economic and financial crises. Systemic risk is by nature unpredictable. Coping with a systemic crisis often requires extra resources: the evolution of a crisis will often lead to a negative-sum game for all of the major actors involved in the system.

Given the conditions of the global economy, with fully free capital movements, interconnections play a more decisive role than ever before. Complexity and interconnections are novelties for regulators searching for a more efficient balance between rules and markets.

Some market participants (to be called Systemically Important Financial Institutions or SIFIs) have assumed a special role thanks to their size, functions, products, and services. Various financial business components rely heavily on SIFIs and, therefore, any difficulty affecting a single SIFI can trigger major financial and real instability. Because of this centrality many SIFIs are perceived to be Too Big To Fail (TBTF). Organisations that cannot default clearly violate many of the main assumptions underlying widespread theoretical approaches to macroeconomics and finance. The big, complex TBTF organizations are themselves a risk factor. Private objectives (i.e. value creation and profit) and public ones (i.e. financial stability and ordinary market conditions) have to be reconciled in a new economic environment. Paradigm shifts in both management and regulation could be likely needed. Have regulators taken enough steps in this direction? Do they have to design new rules or enhance existing ones? Are rules relatively more important than market incentives or the other way around?

To answer these questions, we first redefine systemic risk in the light of the global financial crisis and then we study the SIFIs paying particular attention to their post-crisis changes. Below, a general framework is defined and the regulatory proposals are examined in its light, with particular reference to the new roles of Resolution Authorities and banks' "Living Wills". A readily available fund to support SIFIs and capital strengthening tools will be also discussed. A broader range of resolution tools will not suffice to tackle the new financial risk landscape. An innovative proposal based on "high trigger" bonds with a special trigger event is presented that will integrate regulation and market instruments. The new operating conditions will suggest a significant paradigm shift away from the past, to which new "combinations" of regulatory and managerial responses should be adapted.

Beyond capital strengthening, the new scenario requires new relationships among significant systemic players and macro-prudential regulatory authorities. SIFIs will need to participate in the new Global Financial Safety Net, as defined by IMF (2011b).

### 1. Systemic Risk vs Financial Risk

Systemic risk is not an intuitive concept. It constitutes two elements:

- a risk on the one hand (e.g. threats of adverse events diverging, to a varying extent, from the medium-term experience-based expectations);
- a systemic effect on the other hand (e.g. adverse events affecting a larger system of economic agents, beyond the initial one).

Therefore, when a significant risk arises, the problem will be tackled by taking private and public measures, through a "combination" of rules, resources, incentives, agreements and sanctions. These will affect the way that the risk will occur in the future. A risk to the system will always manifest itself in new ways since the conditions under which it arose previously will likely to be already under control. These observations influence the instruments (techniques, models and conducts) available to cope with the risk.

What is our best approach to manage events having systemic impacts? Nassim Nicholas Taleb's theory (best known as the "black swan" theory) offers a formal view on guiding principles to tackle unpredictable events, useful for our further analyses. "Perfect storms" are rare events; therefore, one cannot gain enough experience either through past history or through scientific or financial observation; and probabilities cannot be estimated using scientific (or quantitative) methods. The resulting uncertainty will challenge quantitative approaches. Prompt coordination among various significant agents (i.e. coalitions, cooperation, competition, command and control) is often needed. Individual and collective behaviour has to be deeply scrutinised and modified. Role of regulation and institutions is to set right incentives and penalties.

Taleb (2008<sup>1</sup>) distinguishes between types of probability distributions:

- “thin tailed”, which allow the observer to identify quite accurate and stable central trends with very low extreme frequencies;
- “heavy tailed”, in which the tail distributions are quite “fat”, “unpredictable” and uneven.

The latter will hide the most dangerous “black swans”, since the seemingly rationality of the statistical measures may hinder (i.e. fail to contribute to) the search for solutions.

To be able to “coexist” with complex distributions (low frequencies, very high impacts), “optimization” techniques will not apply. Taleb mentions a few rules to be followed, starting with the examination of historical events<sup>2</sup>, which can be summarized as follows:

- avoid the prediction of remote payoffs. “Tails” will always be characterized by anomalous events. Extrapolating from ordinary conditions about circumstances far from the average is invalid. Such conventional measures and methods as volatility, standard deviation, linear regression will lose their meaning when considering such extreme events. They may turn out to be misleading and to induce a false certainty. Low volatility (which may persist under ordinary conditions) should not be confused with an absence of risks. At the same time risk figures and metrics have to be clear and have to stimulate (instead of prevent) varied interpretations, showing limits (not only benefits) of the methods adopted;
- look at long time-series: it takes a long time for a time series to reveal its properties, at least at a qualitative level;
- beware of “moral hazard”: incentives and delegation of risk management decisions should reward experience too, not only be based on risk measures. When breakthroughs happen, the boundary between models and experience fades away. Experience is able to capture weaker signals, that models underestimate.

Taleb directs attention to system “redundancy”. This “redundancy” is the surplus of resources (i.e. financial, organisational, professional and technological) available to ensure continuity against the occurrence of unpredictable events. When tackling uncertainty, managerial experience and interpretation is fundamental. Early detection often derives from weak signals, not to be dealt with as “pure exceptions”. Living with “black swans” will require greater attention to a broader variety of risk factors than were employed in the past. Bearing these considerations in mind, we now tackle the next topics.

## 2. Today’s sources of systemic risk

Systemic risk arises always in different ways. What could drive today’s systemic events?

Financial imbalances are major indicators of a financial crisis; free trade and common financial markets internationally facilitated the propagation of crisis. Inter-country linkages are a main source of latent systemic instability (IMF, 2011c). The global financial system has today major imbalances, as pointed out, inter alia, by Gourinchas, Rey and Govillot (2010<sup>3</sup>) in their re-evaluation of international capital flows from 1952 until today.

The current crisis has significantly impacted financial and monetary aggregates. The financial system has gradually become the first global infrastructure of the new century (Maino, 2009, Blanchard and Milesi-Ferretti, 2011), having to handle huge volumes of funds. The international macro-economic system has managed such a situation in an increasingly frenetic way. Such a context favoured supply and demand of financial innovation. At the same time a considerable shadow banking system developed in a few years,

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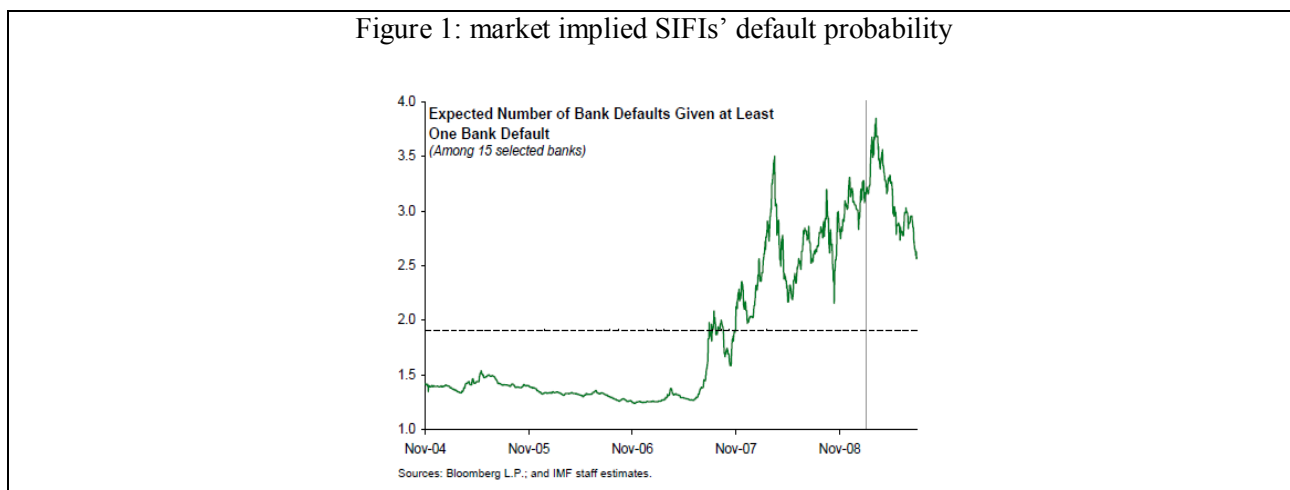
<sup>1</sup> Reference will be made herein to the contribution made at the Edge Foundation, 2008, which is indeed very stimulating, especially as far as the technical-statistical appendix is concerned.

<sup>2</sup> “Indeed, I have shown, with 40 years’ data, that the past Black Swans do not predict the future Black Swans in the social-economic life”, cf. “The Fourth Quadrant”.

<sup>3</sup> The survey is one of the initiatives of the Institute for New Economic Thinking – INET, the economic research organization fostered by five Nobel prize winners, including George Akerlof and Joseph E. Stiglitz, as well as by economists such as Charles Goodhart, Axel Leijonhufvud, Jeffrey D. Sachs, Anatole Kaletsky and Roman Frydman.

which now operates in parallel with the official one<sup>4</sup>. The aggregate creation and allocation of money has changed, causing a crisis of traditional governance mechanisms (ECB 2010, page 147 and next, Section E)<sup>5</sup>.

Today, interconnections among segments, markets and functions are one of the most important challenges, as shown, for instance, by the ECB (Financial Stability Review, 2009). Also, so-called “contagion” is more likely (IMF, 2011a, states that this situation also applies to developing countries, even though the dependence on the developed ones continues to be quite high). Contagion among banking organizations (the main financial intermediaries, even in the form of universal groups performing a wide range of functions) is increasing, as shown in Figure 1 (IMF, 2009).



A look at the post-crisis financial landscape begs the question: can the institutional and functional structure of the financial system remain unchanged when so much innovation is taking place?

The traditional financial system can be viewed as a top-down structure (hierarchy) with three layers: non-financial operators, intermediaries, and central banks<sup>6</sup>. At the top, central banks relate (not hierarchically) to governments and supra-national, financial and non-financial institutions. These agents establish relationships to provide some discipline and to allow some flexibility to the financial system.

Mehrling (2010) describes this set of relationships as a plumbing system that, despite lying behind apartment walls (and, therefore, out of sight), is essential for the functioning of the apartment itself. The opening of capital flows, as well as financial innovation and the role played by the financial markets (regulated and unregulated) paved the way for new leaks and/or links in the “plumbing” system. Some intermediaries have assumed a peculiar role, often almost as essential as the one played by central banks. Large Complex Banking Organisations/Institution (LCBO/ LCBI) took a specific role, becoming universally oriented intermediaries. They were increasingly perceived as well as Too Big/Important to Fail (TBTF/TITF). The concept of “Systematically Important Financial Institutions” (SIFIs) derives from this new status (Ötker-Robe et al., IMF, 2011).

Table 1 summarizes the preceding statements. The “lending of last resort” function – providing emergency liquidity to banks and other SIFIs – is crucial to keeping the system functioning over time. As many economists have pointed out (including Bagehot at the end of the 19th century) during financial turmoil, such functioning requires that at least one agent show very high risk tolerance (cf. Masera 2001, Chapter 1). This can be achieved when:

- governments and central banks have reliable and promptly available resources in large volume;

<sup>4</sup> Both the IMF and the FSB have calculated the amount of assets in the shadow banking system outstanding at the end of 2010 to be approximately 16,000 billion USD (FSB 2011, IMF 2011).

<sup>5</sup> During the G20 meeting held in Paris on February 18-19, the summit identified a set of new systemic risk indicators to be monitored by international financial institutions.

<sup>6</sup> Mehrling (2010) reviewed the text by Bagehot (1873) in *The New Lombard Street—How the FED became the Dealer of Last Resort*. The text conforms to the so-called *The Money View*.

- the size of the intermediaries that may get into trouble is quite small with respect to the liquidity available from the central bank (this essential condition was violated during the recent crisis).
- intermediaries exposed to systemic risk turned out
  - to need too many funds in respect to the size of short-term funding able to be granted by governments and the financial and monetary authorities, thus requiring exceptional bail outs;
  - to perform functions quite similar to the ones performed by the central banks, such that part of the system functioning depended (and still depends) on their intermediation and structuring functions.

Table 1: Financial and Monetary System in a functional approach

Financial and monetary policy governance levels	Economic agents roles and constraints	Regulated System		Lower regulated system
	Traditional functions		Sophisticated functions	SIFI / TBTF / LCBOs roles
• Government and supranational institutions	Growth and economy's potential achievement under external net balance position constraint and prices stability	Fiscal policy and central bank account position; IMF and WB facilities and other credit sources.	Direct placement of government debt; crisis management (like TARP). Crisis prevention	<ul style="list-style-type: none"> <li>– Wholesale banking</li> <li>– Plain Vanilla and complex derivatives hedging</li> <li>– Structured &amp; Leveraged Finance Banking System</li> <li>– Shadow Banking System</li> <li>– Placement &amp; Trading of Synthetic products</li> <li>– Arbitrage and compensation among highly regulated and OTC / low regulated markets</li> <li>– Settlement and management of structured, complex, illiquid and sophisticated securities and product portfolios, primitives and derivatives</li> </ul>
• Central Banks	External currency balance constraint (reserves); financial and price stability	Currency position among central banks. Crisis management		
• Financial Industry and Intermediaries	Liquidity and settlement constraint (cash flows and payments intertemporal equilibrium)	Interbank currency and financial clearance; central banks' facilities and discount lines	Complex capital market transactions; shadow banking system; structured finance; derivatives' markets; OTC markets.	
• Non financial sectors (real economy)	Balance sheet and settlement constraint (liquidity, solvability and payments)	Payment system and cash flow applications (deposits vs. available facilities' usage); corporate finance net position management	Direct placement on int'l capital markets; OTC hedging and risk exposures	

Source: our elaboration from considerations of Mehrling (2010)

The new prominence of the shadow banking system has made part of banking assets free from regulatory constraints, thus making it possible to perform a monetary function well beyond what can be seen from statistical data (refer to Maino, 2009<sup>7</sup>). “Quasi-capital markets” have been created within the biggest multinational financial conglomerates, with the ability to transfer funds instantly from the traditional *originations* to the “front line” of trading floors and, hence, to external investment systems (Special Investment Vehicle – SIV). From an industrial organization perspective the transformation of markets changed competition, positioning and market-strategy processes in a distinct way. As we have seen, certain functions of these financial intermediaries, which have evolved both individually and as a system, have had great significance at a public level. Consider, for instance, the continuity of market confidence, assets' rational pricing and transparency on contracts' risk structures, and so on.

In general, all functions that economic theory ascribes to financial intermediaries will generate positive or negative externalities to other operators. Table 2 shows a concise list of these functions in the first column; the other columns briefly account for the development of such functions over the past fifteen years.

<sup>7</sup> Such a possibility had already been pointed out by Goodhart, 2005.

Table 2: evolution of Large Complex Banking Organisations (LCBOs) economic functions of in the last 15 years

Fundamental functions of financial intermediation in the economy	Traditional functions	New and sophisticated functions mainly supplied by complex financial organisations (SIFIs)
<ul style="list-style-type: none"> <li>Financial resources transformation by maturities, markets, liquidity and risk profiles. Risk transformation and transfer.</li> </ul>	Primarily on local/regional/national markets managing quasi-closed financial circuits. Mainly devoted to local intermediation, transforming short term deposits in medium term investments in the real economy	Clear distinction between retail and investments banking (often in different business units), important contribution of “wholesale” banking; complex organisational structure and composite resources transformation among sectors (regulated, low regulated, HF, SIV, SPE, etc..)
<ul style="list-style-type: none"> <li>Payment system management and continuity, settlement and custody in a modern monetary economy</li> </ul>	Prevailing retail banking and direct relationship with local customer base. Settlement and custody of high-liquid/low-risk financial instruments (mainly securities and sovereign bonds)	Important “wholesale” functions with moderate retail customer relationships. Structuring, market making, complex product design and settlement. Opaque and complex products pricing, placement, hedging and valuation (levels 2 and 3).
<ul style="list-style-type: none"> <li>Monitoring and management of information asymmetries on borrowers, financial markets and asset values</li> </ul>	Prevailing local private economy financing. Relationship banking orientation and medium/long term financing	Mainly orientated to transaction banking (except corporate banking). High risk rotation (Originate to Distribute business models), opaque and complex products, operations on exotic or markets difficult to get to.
<ul style="list-style-type: none"> <li>Funding and asset liquidity supply, transaction management and market making</li> </ul>	Mainly credit risk, medium term maturities, low portfolio rotation; treasury functions like cost centres. Marginal role of proprietary trading and functional to financial intermediation	Illiquid assets transfer on liquid markets and high risk rotation. Treasury functions like profit centers. Primary and secondary liquidity managed as investment portfolios. Liquidity coverage horizons only on short term horizons.
<ul style="list-style-type: none"> <li>Efficient pricing structure, rational resources’ allocation</li> </ul>	Mark-up and mark-down determined mainly by local competition, efficient processes and local placing power.	Pricing processes also generated on “internal quasi-markets”; pricing and hedging opaqueness and complexity. Illiquid transactions; complex and sophisticated products’ valuation (level 2 and 3 models)

Source: our elaboration from considerations of Masera (2001)

Many of these functions have moved towards privately managed environments, despite their having a significant public impact (e.g. functions essential to financial stability). Such dislocation was not perceived as negative during the years leading to the crisis. A lot of confidence was put on markets’ self-regulation, on the discipline imposed by market analysts and on rating agencies, as well as on internal risk management systems. Markets and rating agencies have failed to perform their functions and they represent the biggest failure of the financial crisis. (Maino, Masera, Mazzoni, 2010)<sup>8</sup>. These considerations have led the IMF to state that the SIFIs “fail to fully internalize the social costs of their operations; the reduced market discipline allows shareholders and management to take greater risks, leading to inefficient capital allocation, potential liabilities for taxpayers, and a competitive advantage over systemically less important institutions” (Ötger-

<sup>8</sup> Not to mention conflicts of interest, quite unavoidable when private firms reach significant market size. The risk of collusion turns into much more than a mere assumption. Recent disclosure of possible LIBOR manipulations by the major market actors is a clear example (Finch & Menon, 2011). The Office of the Controller of the Currency has detected that a small group of Wall Street “financial titans” is dominating the derivatives’ market. In fact, the four most important institutions (JPMorgan Chase, Citigroup, Bank of America and Goldman Sachs) hold approximately 95% of the industry’s total exposure to derivative contracts.

Robe et al., IMF, 2011). Today it is perceived that some key systemic risks are underestimated and that, at the same time, intermediaries' ability to manage their risks in the new global financial economy is overestimated<sup>9</sup>. At the same time, irreversible changes have taken place in the financial system and a return to the past is quite impossible (Llewellyn 2011). This assessment provides the framework for the following analysis.

### 3. Systemically Important Financial Institutions

#### 3.1 How can SIFIs be detected?

BCBS (2011b) provides a methodology for identifying so-called G-SIFI, i.e. Global Systematically Important Banking Institutions<sup>10</sup>. The FSB (2011b) adopted these criteria, finalizing a list of international financial and banking groups to be defined as G-SIFIs and it also suggested policy measures to address the risks and externalities associated with Systemically Important Financial Institutions. These documents are the result of a long debate on the right way to define a SIFI. Central banks, market operators and financial economists have, from the beginning, searched for an impact measure suitable to the new context and the new forms of risk (Huang, Zhou & Zhu, 2010, and Giesecke & Kimy, 2010). How can we identify financial groups that are exposed to systemic risk? Research carried out by the World Bank (Dijkman, 2010, pages 7-8) outlines the criteria that one should assess to determine whether parts of the financial system take on real systemic significance:

- functions, i.e. whether the products and services relative to the system's concerned part are actually essential to the other parts or, at least, to certain users' classes (e.g. families, small- and medium-sized enterprises, governmental bodies and the other banks) to such an extent that they can adversely affect their functionality;
- counterparts, i.e. who are the main users, operative counterparties, creditors and debtors and how many of them there are;
- size, i.e. the economic significance of the transactions, activities and liabilities placed with the various sectors, both in physical and monetary terms;
- substitutability, i.e. the ability to cope with an activity's failure through replacements by other parties within a reasonable time period so as not to compromise the system itself, by also specifying the cost impacts.

The approach based on the above criteria is qualitative, since a clear, quantitative systemic risk indicator is not available. Furthermore, size may vary depending on the individual markets' conditions and both the functions and the substitutability may change in time in connection with the organizational features, technology, user's choices, knowledge of and access to the international markets.

Despite these caveats, the BCBS adopted a definition based on selected quantitative indicators that reflect banks' size, interconnectedness, lack of substitutability (or financial institution infrastructure for the services they provide), global (cross-jurisdictional) activity, and complexity<sup>11</sup>. To provide flexibility in the application of this definition, the FSB affirmed that the list of G-SIFIs will be updated annually and published in November of each year. The BCBS methodology will be reviewed every three years to capture changes in the banking system and progress in measuring systemic risk. Further, this first list contains only globally systemically important banking groups; future lists may also contain G-SIFIs that are not banking groups<sup>12</sup>.

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<sup>9</sup> This occurs especially in the UK. Refer, for instance, to the repeated remarks made by Sir Mervyn King (the Governor of BoE) and the "Turner Review", which originated from the immediate post-crisis analyses, as well as to the Vickers report suggesting the division of activities between commercial banks and investment banks (the so-called "ring fences").

<sup>10</sup> Seventy-three institutions have been examined because of their potential exposure to global systemic risk (the so called G-SIFIs); twenty-eight of them have been recognised as such and will have to increase their capital supply as indicated by the new regulation.

<sup>11</sup> The size, interconnectedness and substitutability/financial institution infrastructure categories are in line with the IMF/BIS/FSB report submitted to the G20 Finance Ministers and Central Bank Governors in October 2009.

<sup>12</sup> The additional loss absorbency requirements will begin to apply from 2016, initially to those banks identified in November 2014 as globally systemically important using the allocation to buckets at that date.



This flexibility requires a qualitative, multi-standard approach targeted at the specific operating conditions both in the course of time and space. BCBS assures continuous monitoring, differentiation among the systems, countries, markets and products (IMF and BIS staff, and Secretariat of the FSB, 2009, page 2) to try to overcome the main criticisms that the criteria that identify G-SIFIs have been subject to (as we'll see later).

### 3.2 Are SIFIs useful?

The BCBS/FSB's SIFI determinants are not obvious. The Volcker rule in the US and the Vickers Report in the UK suggest more radical measures, like a clear split ("ring fences") between retail and investment banking businesses (for a more in-depth discussion see IMF, Chow and Surti, 2011). So, at the moment, FSB and BCBS are accepting SIFIs' business models and trying to impose higher capital requirements.

A number of points have been raised during the past two decades, concerning the optimal size of complex financial organizations. This is particularly so today. The UK, in fact, is adopting a "ring fence" approach to split big financial conglomerates into two separate parts according to their businesses; in particular, one part involving traditional commercial banking activities and the other pertaining more sophisticated and innovative ones. Many arguments have been brought forward, both advocating and opposing this approach. The main ones are: access to economies of scale and scope, risk diversification between markets and products and liquidity and functionality of the global capital markets.

Against the approach it has been argued that the greater size and complexity of these organizations may be managed efficiently by applying quantitative risk management methods<sup>13</sup>. Going back to the "lessons from the crisis", the IMF pointed out (2010) that there is no evidence that the achievement of scale and scope performance is decisive for either competition or intermediation costs (Haldane, 2009). For this reason, the IMF promotes the search for spontaneous balance in size-related efficiency, by making the potential systemic risk cost explicit, with additional capital and liquidity components, to be used as "buffers" for the system. This could lead, on the one hand, to voluntary activity break-down or shut-down or to the simplification of the organizational and corporate structures, which will benefit the entire system in terms of efficiency and strength. On the other hand, it could lead to more capital being set aside for larger sizes. The cost of the capital surcharge could act as a kind of "tax" on systemic risks, similar to an insurance premium. Further, the proposal for structural measures to split banking businesses (e.g. the "narrow banking", Volcker rule, etc.) could be mitigated by corrective strategies (Llewellyn, 2011<sup>14</sup>).

Also against the approach several studies (for a review see Goldstein and Véron, 2011) show that the diversification benefits also exist for smaller and less complex institutions; increased market concentration reduces the opportunity to diversify risks. Analysing specific cases (e.g. AIG's bail-out and Lehman's bankruptcy) it appears that, when a financial system ends up relying on a small number of large institutions and complex organizations, the system itself will lose the benefits resulting from the initial diversification (Persuad, 2006).

The tendency of the various institutions to grow in terms of size and significance will not permit either the reduction of systemic risk or its control. If some counterparts become almost exclusive in offering hedging products or specific types of contracts and operations, the risk will suddenly increase instead of reducing, thus cutting down the benefits of financial intermediation in the economy. Therefore, the interconnections and substitutability will represent a new form of moral hazard as well as a significant source of external diseconomies for the economy as a whole. This is also true for the insurance industry, as highlighted in a recent survey (IAIS, 2011, §5.3 and appendix 8). Nevertheless, complex financial conglomerates allow for diversification, given the wide range of activities, functions, markets and instruments on which they can take actions.

The financial industry essentially fosters the diversification argument. A study carried out by Moody's-KMV (Bohn, 2008) some time before the crisis shows that corporate value volatility of listed banks decreased significantly as their size grows (Figure 9). The sector comparison shows, however, that such an

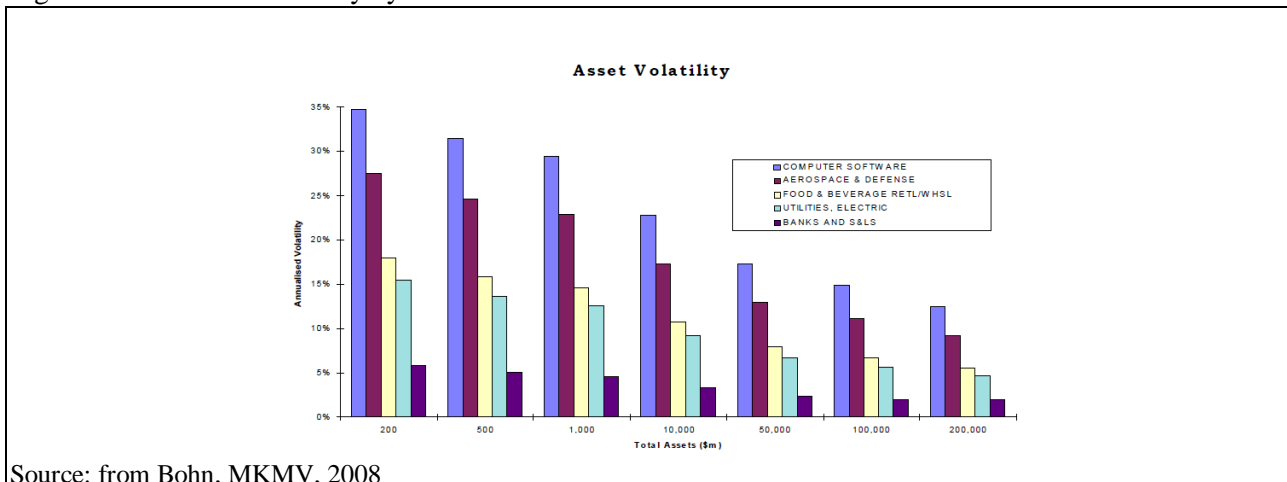
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<sup>13</sup> The same institutions have also argued that the combination of diversification and of advanced risk management practices often allow them to operate using much smaller capital resources compared to smaller or less complex institutions, thus making the system more efficient.

<sup>14</sup> Llewellyn distinguishes six strategic regulatory options: *structural regulation* (such as Glass-Steagall-type measures and Narrow Banks), *behavioural regulation* (such as capital and liquidity requirements), *intervention measures* (such as Structured Early Intervention and Resolution regimes), *tax and insurance measures* whereby banks pay ex post to recoup the costs of past bail-outs, *resolution arrangements* and *living wills* (or Recovery and Resolution plans).

effect is often overestimated compared to its importance for industrial sectors such as utilities and high technology, computers and military defence.

Figure 2: asset value volatility by sector and firm size

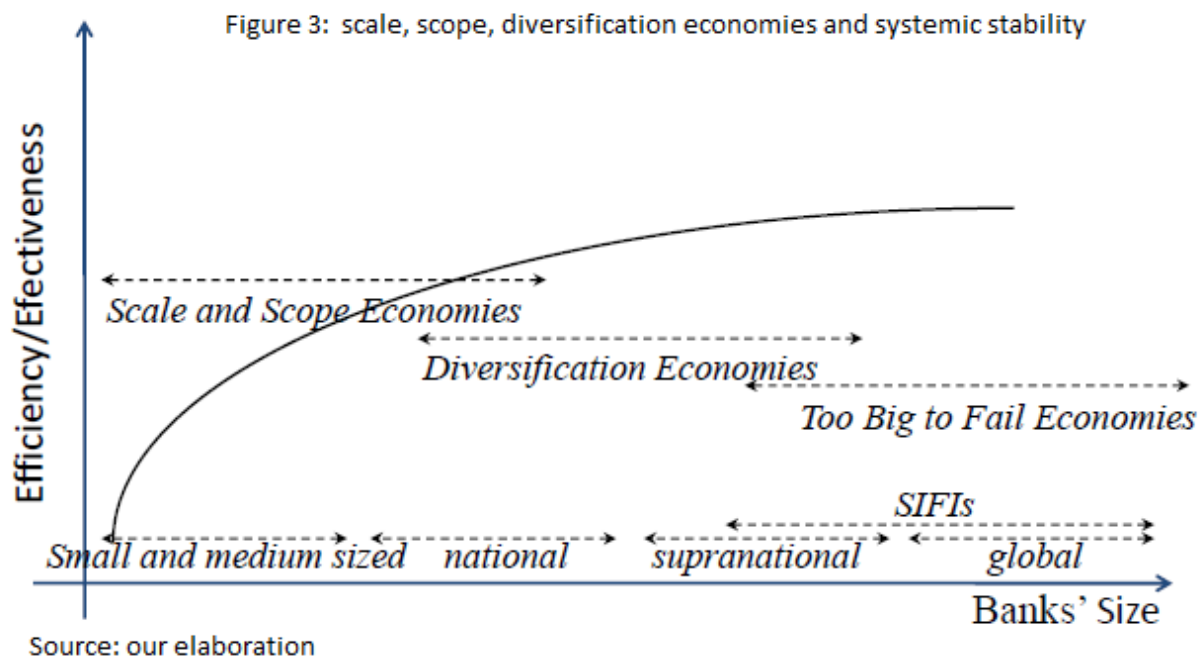


The definition of systemic risk is multi-dimensional and it affects entities such as hedge funds that are currently not regulated or that are subject to less strict and pervasive regulations than traditional financial intermediaries. As a rule, the size, the activity concentration, the interconnections and the correlation between internal activities and outbound activities is not an absolute measure *per se* (Thomson, 2009). The size, interconnection, complexity and correlation are business-specific, i.e. they are not necessarily group-specific items. Many firms may, despite not being financial intermediaries, induce a systemic risk both in the financial and the non-financial sectors (e.g. the automobile industry in the US). Insurers (IAIS, 2011) play similar roles in case of systemic crisis.

SIFIs facilitate access to global capital markets; moreover, they provide liquidity to the system and they can move huge capital resources in case of idiosyncratic and local crises. Furthermore, SIFIs have the indispensable size to experiment and innovate: key features of financial activities are high investment in expertise and capital (risk management, corporate finance, project financing, M&A, and so on). Finally, breaking the SIFIs down may break down business models and financial platforms in the opposite direction to the globalization trends. Bank's large size makes it possible to deal with "big ticket operations"<sup>15</sup> having a stronger bargaining power (i.e. to keep an "arm length" independence from the proposer). Therefore, in the SIFIs are put serious disadvantages, the risk would arise to create "too small to compete" situations towards the real economy (i.e. governments, large industrial or services groups) with resulting regulatory arbitrage. In this regard, SIFIs produce goods needed to the economy, as well as market and product diversification. Moreover, financial innovation makes it possible to overcome the functional distinction (e.g. the Glass Steagall Act ones) in the course of time setting up opaque structures that would not protect against the related risks (e.g. "shadow banking" vehicles).

These arguments can be represented graphically (see Figure 3). The horizontal axis shows the intermediaries' size indicators, and the vertical axis shows efficiency indicators (such as capital risk adjusted returns). The argument put forward by the IMF states that the curve will initially be very steep and will actually flatten at a later time (some surveys place such a level at \$50 billion US total assets, some place it at higher values close to \$100 billion US). The size reduction cost will therefore not be significant to the system, especially if it is compared with system risk posed by such intermediaries. Therefore, a key problem will be to identify the most drastic way of breaking the SIFI/TBTF link, i.e. the bankruptcy threat for multinational groups should be substantial, actual and triggered in a timely manner.

<sup>15</sup> One cannot ignore the threat of other operators establishing a sort of super league that includes few, major institutions. They would have greater capital resources (i.e. higher solvency, at least in ordinary times), as well as a significant size, and would be "labelled" as systemic operators, i.e. they would be capable of taking more complex and higher risks. In this case, they might alter the competition rules to their own advantage.



### 3.3 Is SIFI default a viable option?

Illiquidity is likely to arise in a product market that features high interconnections. Banks -- which are very highly levered companies -- are exposed to systemic risk factors despite their capital strength, especially when they become large.

Under ordinary market conditions, intermediaries rely both on traditional management tool such as risk prevention and hedging, and on ordinary and exceptional supervisory scrutiny. The same applies to markets: when ordinary conditions exist, well-established acquired management rules will apply.

Problems arise when systemic risks are triggered

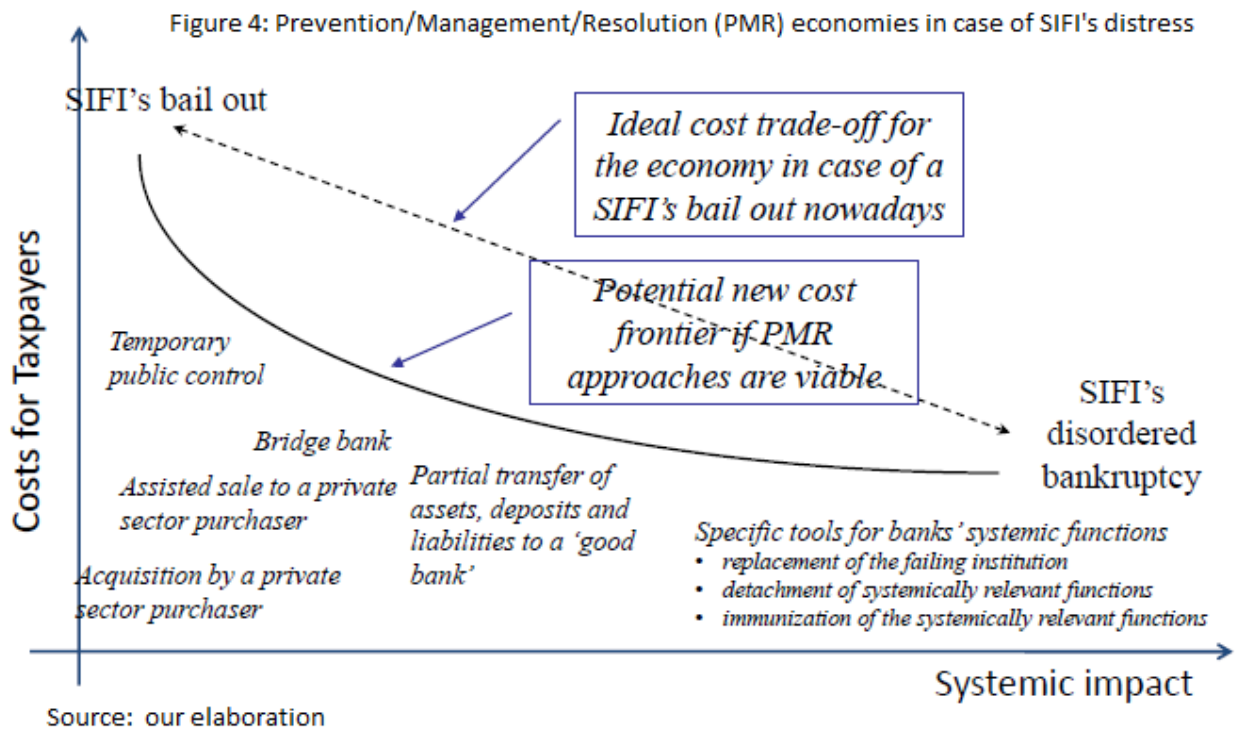
- by external conditions (e.g. economic, political and social crises, wars or natural disasters);
- by unexpected events that cannot be immediately managed, which concern the intermediaries having a systemic role and impact.

In principle, the system should provide reserves (the so-called “redundancies” mentioned by Taleb) both at the individual and at the systemic level. At the individual level, the size of the redundancies is currently assessed by stress-tests: “threat” scenarios with varying levels of severity. This criterion is quite imprecise and regulators are still looking for ways to compute the right amount of redundancies at an individual level; however, it falls outside the scope of this paper to discuss these arguments. It is worth noticing that operative specialization of intermediaries poses one further problem. Each intermediary measure their own risk as a “net” position, matching gross exposure with hedged ones. If an intermediary specialized in a given product fails, the banks that have bought protection will be in trouble too. A bank’s exposure to systemic risk will therefore depend both on the existence of a risk to the system and on the location of such a risk among the various counterparts. Even banks managed on the soundest basis will not be immune to the systemic risk posed by highly specialized banks and the concentration of their transactions.

In the last few years many weak points have emerged both in standards and coordination as well as in the power and the ability to take appropriate measures. Recently, regulators have been focusing on these issues.

Figure 4 (see also to Čihác & Nier, 2009, and to Carmassi, Luchetti, Micossi, 2010) may be of help. This framework allows two alternatives (i.e. bail-out or bankruptcy), which are the two extremes of a frontier that sees on one end full costs paid by taxpayers and on the other end full costs paid by the financial system. Increasing the way authorities can act, enhancing jurisdictional and operative coordination through various procedures, would make it possible to pursue multiple solutions. This approach allows to find more attuned interventions to tackle individual circumstances. The credibility of a threat of bankruptcy of a banking

system makes the frontier between the bail-out costs less binding and more efficient, to everybody's advantage.



Nevertheless, these potential solutions would not be problem-free and many hard questions should be answered: Who should be invested with powers to implement such solutions and, above all, to “early detect” the problems? Is there an authority that will take preventive measures? Should a public authority be involved? Or will the banks be able to operate by applying self-regulatory procedures, thus ensuring they have a safety net to save them in case they are over exposed to an intermediary in distress? Last but not least, what resources should be used? Will the availability of a protection network provide alone the grounds for assuming that certain institutions implicitly enjoy a “too big to fail” status? Furthermore, aspects related to the effect of news releases should be considered. Continuous downgrades play a role in triggering contagion, thus showing the potential effect of such news on financial instability. One should ask how to reduce the effects of such announcements on the financial system.

### 3.4 What is going on in SIFIs regulation

Do the proposals up for discussion deal adequately with the potential consequences of existing systematic risk? The FSB has defined financial institutions of systemic significance (SIFIs) as institutions of such size, market importance, and global interconnectedness that their distress or failure would cause significant dislocation in the global financial system and adverse economic consequences in numerous countries.

Regulation aims to provide a jurisdictional framework for quick, efficient and low-impact solutions to the financial system's destabilization risks, without exposing taxpayers to potential losses. Stronger supervisory control will supplement the policies, constituting solid financial infrastructure for the financial markets—especially for products currently traded predominantly over-the-counter—as well as completion and harmonization of existing precautionary requirements, which will involve case-by-case analysis of situations now regulated by distinct national authorities.

Regulatory bodies must coordinate their efforts firstly to prevent crises and then, in the event that a crisis does occur, to manage its development by supervising the liquidation of financial institutions; thus in-depth legislative revisions must take place in many countries to protect the vital economic functions the institutions provide. Financial institutions must devote internal mechanisms to distribute losses among stake-holders, share-holders and creditors (both guaranteed and not) according to a seniority hierarchy. G-

SIFIs will be subject to a process of quick, mandatory recovery. Preventative plans action needed in a crisis will take into consideration all the relevant operative jurisdictional systems (the so-called “living wills”).

The Basel Committee issued their own recommendations in March 2010, which were drawn on by the G-20 summit in Seoul (November 2010). On January 13<sup>th</sup> 2011, the BCBS announced the agreement reached on a significant number of issues left open in Basel III, including the regulation of intermediaries exposed to systemic risk (BIS, 2011<sup>16</sup>). It is made up of four parts: the boundary of the usable tools and instruments and the post-trigger events, the trigger event, the handling of complex banking and financial groups, and the transient rules.

On January 6<sup>th</sup> 2011, the European Commission issued a reference document concerning a EU framework for bank crisis management and resolution (European Commission, 2011)<sup>17</sup>, providing for, among other things, the set-up of an authority entrusted with emergency powers, as well as several instruments facilitating regulatory action at an early stage of a crisis, to restructure or liquidate the financial institutions without having recourse to the use of taxpayers’ funds.

All credit entities and investment companies will be obliged to build up and maintain detailed plans for assessment, recovery and the possible measures that can be taken immediately against the various stress scenarios, by assuming that no support will be given by the public sector.

One central issue will be “trigger events”, i.e. the conditions under which the authorities will be allowed to enter into action. The document the Commission issued details the stages of the last part of the crisis resolution procedure, i.e. the management of bankruptcy and the ensuing wind-up of the bankrupt institution (see Resolution, part 4).

International initiatives already exist, having been written in the summer of 2011 and concluded with a presentation at the November G20 summit in Cannes identifying three key organizational steps at the European level:

- Step 1: to unify the EU system for crisis prevention as well as the restructuring and liquidation of the bank groups tackling financial turmoil (summer 2011);
- Step 2: to harmonize the systems in force in the EU about bank insolvency to reach a solution platform under a shared jurisdictional and procedural system (end of 2012);
- Step 3: to implement an integrated system for management and liquidation of the banks in financial turmoil. This system should be based, if possible, on one single European authority for crisis management and thereby to establish a European Resolution Authority (2014).

#### **4. To wind up a distressed SIFI**

To avoid future crises in the image of past ones, it is essential to avoid a disordered bankruptcy of a SIFI. International authorities’ statements are clear: In a market economy nobody is too big to fail. Preventing and managing the possibility of a SIFI’s failure (or, put more broadly, of the bankruptcy of a banking group of significant size) has become the de facto the Fourth Pillar of the new capital accord (Basel III); it is now well-integrated with the existing three (Llewellyn, 2011). The matter is anyway how to give enough “credibility” to the threat of default for a SIFI, supposed to be TBTF.

##### **4.1 Resolution fund**

Neither the BCBS nor the European Commission has instigated a buffer of resources to prevent a systemic crisis to assist in absorbing a bank crisis. Several parties in the financial industry (see for instance IIF, 2010, internal document sent to the Chairman of BCBS) however, have put the option forward as a workable solution based on (open) market operations that will avoid taxpayers’ recourse and public resource expenditure.

Moreover, such a solution has political motivation. The crisis led to negative public perceptions of the major financial institutions and aggressive derision of their practices, and as such a return to public interference in the governance of the financial industry has been widely feared. The proposal of a privately established fund for crisis mitigation would have decisively relieved this tension.

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<sup>16</sup> Refer, in particular, to the Minimum requirements to ensure loss absorbency at the point of non-viability appendix.

<sup>17</sup> The document follows the communication by the Commission dated October 20<sup>th</sup> 2010 concerning an EU framework for financial sector crisis management (European Commission, 2010). The final project is expected, once the negotiation is over, to be issued in 2011; it shall inevitably be harmonized with the BCBS’s guidelines.

Many reasons support a fund for this purpose, triggered if necessary by the new RAs—see Masera & Mazzoni (2010), Masera (2011), as well as the proposal put forward by the EBF (cf. Lugaresi, 2011, and Lamanda, 2010). The IMF itself, as we have pointed out above, was (in 2009 and 2010) in favour of resource collection in order to take actions in case of crises, which would be carried out by targeted taxation on financial transactions (Tobin tax) or on the SIFIs themselves (Ötoker-Robe I. et al., 2011, have included, in the appendix, a review of the pros and cons of the different solutions).

The main reason for this solution lies in the ability to take prompt actions, especially in the case of banking groups operating cross border. Masera examines this reason in depth through the specific instance of the G-SIFIs operating in Europe and North America. In fact, the Resolution Authorities could not fully operate as the Dodd-Frank Act is in force on the one side of the ocean, whereas the regulations currently examined at the European Commission are in force on the other side<sup>18</sup>. Moreover, the problem of coordination among the supervisory authorities controlling the markets, the financial intermediaries and the insurance companies, which depend on three different organizations (i.e. ESMA, EBA and EIOPA, respectively), would present itself in case of European entities as well. The fund would reduce (i.e. would not cancel, of course) the risk of loss relative to the senior liabilities issued by the banks. Finally, adequate available resources would make it possible to take prompt action in individual cases. Greater capital availability scattered to all of the SIFIs would not allow the same prompt actions, due to the fact that capital is split in different organisations, which are unable to coordinate to manage activities most susceptible to systemic risk.

The size of such a fund is another crucial point: which and how many resources should be kept ready for use? Several approaches offer approximate answers. If a banks' own funds to tolerable risk ratio exists, then the capital size may provide preliminary information.

At the peak of the crisis the IMF, using CDS market prices, estimated that four of the world's fifteen most important banks would default if one of them did (IMF, 2011). The world's four leading institutions, in terms of total capital<sup>19</sup> (listed common equity), are: Bank of America (€134 billion), J.P. Morgan Chase (€112 billion), CitiGroup (€110 billion) and HSBC (€105 billion). As a worst-case scenario, the full bailout of their capital would, in case of joint default, amount to €461 billion, which may provide a starting point to compute the size of the fund needed to restore the capital endowment at the level before the defaults. A similar calculation can be made with reference to the EU only, where the four leading banks (HSBC, Banco Santander, BNP and Lloyds Banking) accumulated €295 billion of capital assets.

The average capitalization of European banks amounts to €68 billion and is approximately equal to the accounting values. The corresponding capitalization amounted to €133 in 2007, just before the dawn of the crisis. The €65 billion difference may give another clue of the average extent of an intervention during a serious recession.

These values are not far from those experience would suggest: the total amount of capital injections in Europe (including Switzerland) was €314 billion; the average intervention amounted to €12 billion, yet it reached €50 billion in the UK and over €30 billion in Germany.

As a mere indication, the leading European insurance company has an availability of its own amounting to a little more than €40 billion<sup>20</sup>.

One further measure can be obtained by observing the loss risks implied in market prices for a selected portfolio of European SIFIs. We considered a portfolio of forty-one major European banks with listed CDS<sup>21</sup> and extracted the implied default probability on a five-day recursive moving average taking the market risk premium into account. We then calculated the implicit default correlation and quantified the overall portfolio maximum loss at 99 percent statistical confidence<sup>22</sup>.

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<sup>18</sup> Mazzoni & Masera (2010) also calculate the contribution of such fund, studying risk parameters taken from the market and distributed over the various banking groups, following a Component VaR approach. Regarding the peculiar use to this purpose, the “conditional VaR” or “expected shortfall” approach may also be recommended (refer, for instance, to Resti, Sironi, 2008, page 161).

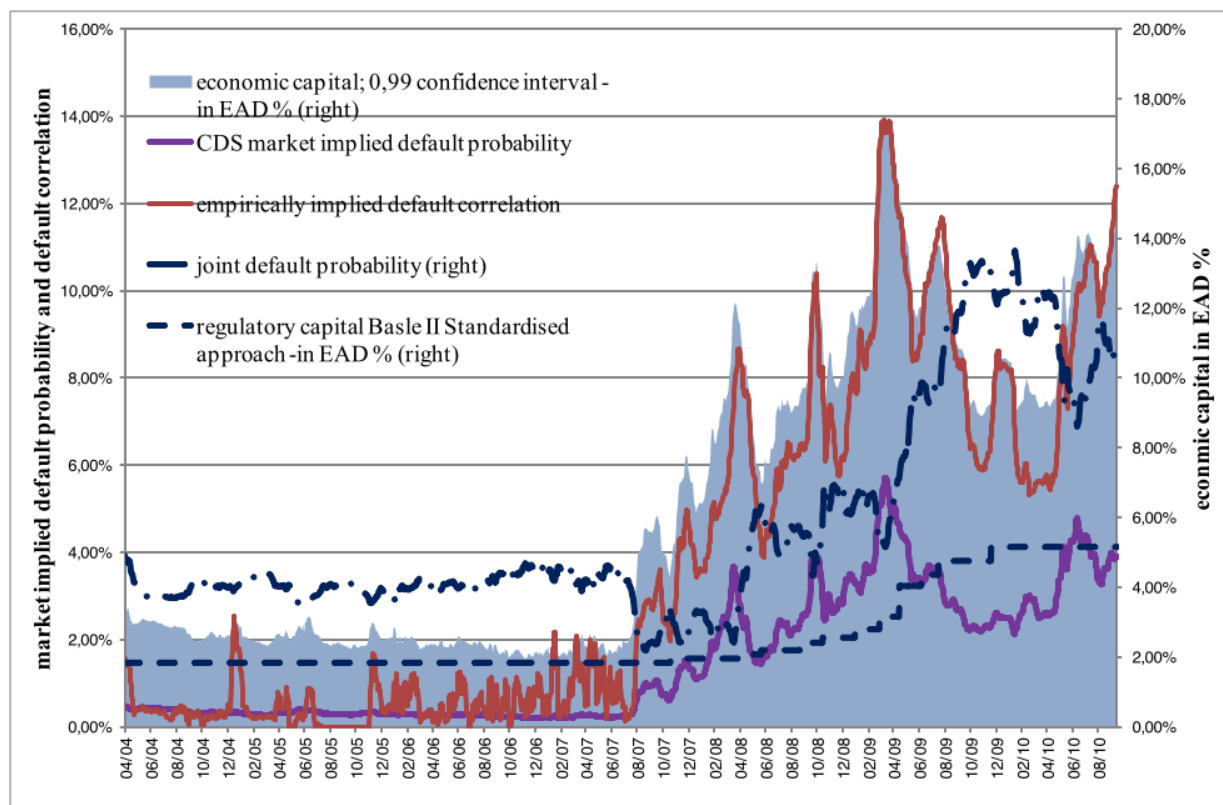
<sup>19</sup> Based on the stock exchange listing and information as to the end of February 2011.

<sup>20</sup> Even though we should consider the essential role of the off-balance risks, which is hard to calculate.

<sup>21</sup> A brief description of the method is given in the appendix.

<sup>22</sup> The purpose of the simulation is, of course, a merely indicative one. The assessment allows to identify the size of the potential requirements of distressed capitals. Though the risk premium effects have been corrected, risk over-representations relative to the worst times of the crisis (i.e. end of 2008, beginning of 2009) cannot be excluded. However, the calculations suffice for the ends we want to pursue.

Figure 5: risk metrics and economic capital for a European major banks' portfolio listed on liquid CDS markets



Source: our elaboration on Bloomberg data (see methodological Appendix)

The fundamental risk measures—average probability of default, correlation and capital—follow a trend quite similar to the one already examined in the estimate made by the IMF (2009). The capital needed to cover the potential losses of this portfolio rises from nearly two percent (during the most favourable conditions) to approximately 18 percent (during the most severe ones), with a through the cycle average equal to 6.3 percent.

A fund amounting to €300 to 400 billion, could provide for additional losses in case of stress, equal to approximately one quarter of the estimated RWAs of the European banks. In this case, it would fill a gap amounting to two or three points of the “core tier 1 capital” for distressed major groups.

The different measures seem to indicate that the right size to set for the fund is between €300 billion to €400 billion at a European level and approximately twice as much at a worldwide level (including the requirements of the fast-growing Asian banks). A considerable amount indeed, yet not incompatible with the self-funding resources of the sector and the major European financial groups and lower than the efforts currently needed to adjust to the new levels set by Basel III. Further, such volume is in line with market expectations as recent surveys among private equity fund managers and specialised investors confirm. In July 2011, some industry comments foresaw that CoCos would be strangled at birth after the BCBS ruled to forbid them to cover enlarged equity buffers imposed by Basle III regulation. Now, European regulators, confronting the sovereign debt crisis, are forcing banks to raise capital. The banks, however, don't want to issue diluted equity because their stock prices are low and thus are deleveraging instead. This pressure is putting the Eurozone at risk of quasi-credit crunch. Many European banking groups are considering using CoCos to overcome this situation. If the market takes off, some experts foresee a large market of €500 billion in outstanding contingent convertible European bank debt. In other words “CoCos are an instrument that's here to stay, thanks to regulatory support in the UK, Scandinavia, Switzerland, Italy, France and Canada, with the market ultimately growing to at least €300bn” (Johnson, FT, November 6<sup>th</sup> 2011).

## 4.2 Fundamental criticisms

The proposal of setting apart resources for use in the event of deep market turmoil inspires objections and reactions. One particularly relevant line of criticism stems from consideration of the game theoretic concept of moral hazard and another anticipates implementation problems given the relationship between the supervising entities and the banks on their watch.

Any one fund established ex ante to pay for the crisis gives rise to an implicit perverse condition for its employment. If it is a public fund, it will favour free riding conduct to the taxpayer's detriment; if it is a private fund, it will trigger a process of competition that a participant will exploit—ultimately, every cooperation game encompasses its own ruin, i.e. the first actor to break the rules will take advantage of the others.

A financial institution's shareholders and creditors have to be aware that they will incur severe capital losses in the event of bankruptcy. This is the only way by which strong enough incentives can be put in the system to generate virtuous incentives relative to risk-taking and risk managing. The lack of ways out would, therefore, represent a necessary but insufficient condition to prevent the too big to fail syndrome from undermining the financial system.

Moreover, if a default threat were credible but resource support were absent, then supervisors too would be induced to interfere and to effect prompt corrective actions. As soon as a systemic risk threat becomes plausible, they will take the appropriate preventive measures according to supervisory dictates, maintaining a forward-looking perspective.

## 5. A proposal for specific high-trigger SIFI Bond issues

The counter-objections may be equally obvious.

Firstly, SIFIs operate within a context of “oligopolistic” equilibrium of a “contestable” market (according to the definition by Nelson & Winter, 1982) where the bankruptcy of one or several competitors is a no-recourse, single-event game with a static dominant strategy, unconditional and univocally defined.

A fund's availability constitutes an implicit put option on resources. The lack thereof may make aggressive strategies against one (or several) temporarily weak incumbents attractive, as to be able to access highly desirable market shares and segments that cannot be mobilized otherwise (even by having recourse to public aid, cf. the strategic actions taken by Goldman Sachs during the recent crisis).

Secondly, capital in surplus will be needed only in extraordinary cases, which are relatively rare (i.e. every 15-20 years historically). This is not a minor argument. Holding unneeded capital in surplus for a long may make discipline less stringent. Shareholders, market participants, and management will adopt opportunistic use of such capital to finance risky operations, which may be concealed to various degrees. An unexpected, sudden crisis would reveal such risks, thus cancelling out the benefits for which the capital had been initially collected and allocated to provide.

Finally, the third counter-objection concerns the power of RAs. The SIFIs (especially the “global” ones) operate in several markets, under different jurisdictions and regulations and supervisory authorities with different local discretionary powers. This situation exposes RAs to many difficulties in taking right and prompt actions, being exposed to potentially divergent interests of different national authorities. Taking prompt actions will be highly favoured by the right to take measures and control directly in the BoDs (because of significant equity stakes, dominant influence and so forth).

No institution exposed to systemic risk can be considered to be safe from the effects of contagion, even if it is managed according to sound, prudent practices. Thus not only the probability that the individual institution fails or becomes distressed, but also its play within the market and its cross-exposures and interconnections play a crucial role.

For this reason, we agree with Goodhart's 2011 statement that our regulatory system has unduly focused on attempts to improve the resilience to shocks of the individual financial intermediaries, rather than concentrating on the stability of the financial system as a whole.

In so doing, regulations may actually have unwittingly added pro-cyclicality to the system, e.g. by encouraging all banks to behave in similar ways, that is to say, to increase the correlation of risks.

The simulation conducted on about forty of the leading European financial institutions is quite illuminating in this regard. When stressed conditions spread in the markets, according to market assessments,



the default correlation intrinsic to the portfolio increased by nearly ten times within a short time—increasing from nearly 2% to 16%. Its contribution to economic capital (to protect portfolio to 99% confidence level) increased from 35% (the other two components being the PD and the LGD) to almost 50%. This was mainly due to the tail effect of the probability density function. As a matter of fact, during the crisis, equity prices penalized a banking group *per se*, despite the quality of their assets and management. Therefore, an integration should take place between the regulatory instruments (with a particular regard to the power of RAs) and the market instruments.

These objections are well known to regulators and can be found in a number of analytical surveys (refer especially to Ötoker-Robe İ. et al., 2011, and Pazarbasioglu C., 2011). More precisely, the awareness has arisen that the ‘Contingent capital instruments have gained increasing support as a potential option to reduce the need for public bail-outs.’ (IMF, 2011). This view has also been shared by the Shadow Financial Regulatory Committee, a group of independent economists who meet at regular intervals in order to make critical assessments of the financial regulatory policies<sup>23</sup>. Charles W. Calomiris tackled these points by making a punctual proposal in a survey written together with Herring in April 2011 (Calomiris & Herring, 2011).

The latter contribution is very relevant since it considers high-trigger contingent convertible bonds (HT CoCos). Instead of low-trigger CoCos—the fundamental idea is to put pressure on systemically important banks to issue new equity after a systemic shock has reduced bank equity values, yet well before the bank approaches bankruptcy. That should also make it easier for these banks to tap debt markets before the market itself falls in distressed conditions.

Calomiris & Herring argue that these instruments are particularly suited to three main objectives:

- signalling role of issuers’ bond prices;
- motivating to convert capital or to build up a pre-emptive capitalization policy in case of turmoil and potential distress;
- setting an *ex ante* attitude *vs.* *ex post* intervention.

The last is particularly notable. The threat of capital dilution in the event of conversion puts remarkable pressure on existing shareholders to act promptly to enhance the bank’s equity base, in order to avoid loss of power and value. A properly designed requirement can provide unique incentives that will both motivate banks (in particular, SIFIs) to implement strong systems of corporate governance and raise additional capital or sell assets in a timely fashion. Finally, a suitably designed CoCo requirement would supplement supervisory oversight with market discipline. Within such a perspective, high-trigger CoCos could play a central role in setting incentives for the maintenance of adequate capital, especially for large institutions, thus limiting the too-big-to-fail behaviour. This potential contribution of high-trigger CoCos is also recognized by the BCBS which, in its last consultative document (2011), details the Proposed minimum requirements for going-concern contingent capital in Annex 3<sup>24</sup>.

We also agree with Calomiris & Herring’s considerations about the features of these issues:

- their value has to constitute a substantial portion of the outstanding equity value;
- triggers have to be based on market values;
- all the CoCos issued by the same institution have to feature the same convertibility attributes (i.e. convertible at the same time, price, conversion rate and subject to the same trigger event – with no exceptions).

Finally, the conversion rate has to be highly dilutive to pre-existing equity holders.

Our proposal will be along the same lines. We point out that, having the new stricter regulation in place, new financial crises ought to be idiosyncratic, like natural catastrophes – and, hence, extreme (at least in statistical terms).

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<sup>23</sup> The Shadow Financial Regulatory Committee includes such renowned members as George G. Kaufman, Charles Calomiris, Kenneth W. Dam, Edward J. Kane and Robert E. Litan.

<sup>24</sup> Nevertheless, the BCBS concludes << Based on the balance of the pros and cons described above, the Basel Committee concluded that G-SIBs should be required to meet their additional loss absorbency requirement with Common Equity Tier 1 only. ... The Group of Governors and Heads of Supervision and the Basel Committee will continue to review contingent capital and support the use of contingent capital to meet higher national loss absorbency requirements than the global requirement, as the high-trigger contingent capital could help absorb losses on an ongoing concern basis. >>

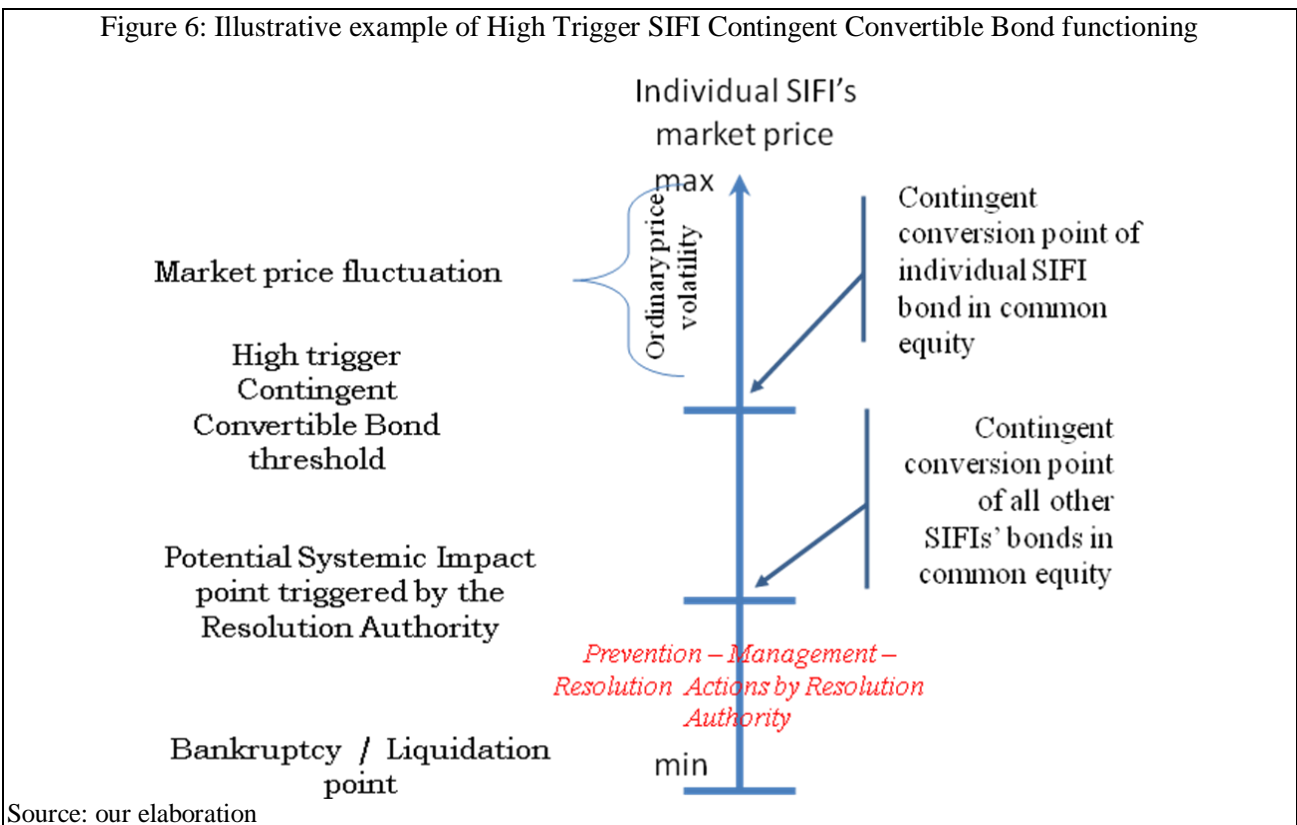
The SIFIs are most affected when there is systemic turbulence; therefore, they shall be more solid as a whole, not only individually. According to these considerations, we propose to change the “trigger event” of the proposed CoCos. Just because of the systemic relevance of the SIFIs, we propose the following:

- at the individual SIFI level, High Trigger CoCo should trigger just as proposed by Calomiris & Herring;
- at the global SIFI level, HT CoCo bonds will be converted at the same time when at least one SIFI defaults.

The second point is the most original one in our proposal. All SIFIs’ CoCos should be triggered simultaneously in the event of any one bank having to fall in the resolution process, because of a decision of the newly established Resolution Authorities (both in the EU and the USA). The same competent RA would be entrusted with deciding whether to involve all the SIFIs in the event or to select a smaller number of SIFIs, maybe the ones most interconnected with the distressed one, leaving the others out of compulsory conversion. Well-capitalized SIFIs could be exempted, too. Figure 6 depicts the trigger functioning.

When the second trigger causes conversion, the voting rights deriving from the conversion will be attributed to the competent RA for a predefined period of time; they will release these powers once the worst times are over. The same RA will decide whether to allow the exchange of converted capital into new CoCos or distribute the capital to the new shareholders (ex-conversion), diluting the existent capital.

Figure 6: Illustrative example of High Trigger SIFI Contingent Convertible Bond functioning



This (apparently) complex mechanism has some remarkable advantages. SIFIs are highly connected with one another. It is credible neither to the market nor to its supervisors that the individual capital will be sufficient to avoid a systemic crisis when tough times in fact arrive. The financial system will need more capital, well diffused and allocated in the critical financial hubs, automatically available via market and contractual clauses.

Moreover, SIFIs operate in an oligopolistic market. Under threat of a trigger event they cannot fully manage independently, they could avoid the one that is trying to take advantage from a weak competitor, pushing him to get weaker and weaker and finally fall in the resolution procedure (established in the living will plan). The competitive game will, by itself, create a systemic risk in this case.

A unique trigger will empower the RAs (and supervisory colleges) and help to overcome local problems. RAs could rely also on managerial power, not only on legal tools and devices, differing according to individual jurisdictions and subject to local limitations.

A proper CoCo requirement, alongside common equity, would be more effective as a prudential tool and less costly than a pure common equity requirement. Such a proposal could be better accepted by regulators. This mechanism will leave less idle capital invested in SIFIs and thus reduce the hazards caused by uneven playing fields in the financial industry.

High-trigger CoCos can create strong incentives for prompt re-capitalization of banks after significant losses of equity but before a bank has run out of options to access the equity market. This consideration could be enhanced if a CoCo's trigger event depends both on the issuing SIFI and on the behaviour of the others in the system. A dynamic incentive based on SIFIs' market prices would encourage global, effective risk governance by individual banks, providing a self-sustaining alternative to the "too-big-to-fail" problem. At the same time the approach reduces forbearance risk (supervisory reluctance to recognize losses) and reduces uncertainty about the appropriate amount of capital banks need to hold.

How should these issues be valued? The value of a High-trigger single-event SIFI CoCo bond represents a mix between:

- a first-to-default basket in terms of trigger probability;
- an individual contingent convertible bond, priced in terms of conversion value, dilution and capital impact.

Bonds with more attractive conversion rates (due to sounder leverage and management) will be worth more, given the same trigger probability, even more than common CoCos. Increases in the event probability will reward best SIFIs and will penalize the worst ones. These price movements will put pressure on the shareholders to act (and promptly) as a system as a whole, instead of on a bank-by-bank basis. The competitive game could be reversed to a virtuous (and cooperative) one, instead of a vicious circle to weaken one (or several) SIFIs.

Last but not least, the prompt availability of capital in bad times could undo the effects of cross-exposures causing correlated failures for SIFIs; instead of collapsing together they will react individually. Sovereign issues could do the same. The market's knowledge that the entire system will be promptly re-capitalized in a crisis, could reduce the interdependence between a sovereign's near-default and domestic financial stability.

The key idea that the trigger event affects all of the subjects (even the ones who have behaved virtuously in terms of undertaking and managing risks) may surprise some. To this regard, it should be kept in mind that systemic risk will, within the context of high levels of interconnectedness, impact not only individual SIFIs but also the aggregate system. As with a Medieval town, a common fence around the perimeter is a more effective defence than fortifying each individual house.

If a bank's bond is triggered, the conversion mechanism pressures its existing shareholders. Should sudden event occur unexpectedly, without the market anticipating it (e.g. the case of Jérôme Kerviel's rogue trading at Société Générale in 2007-2008), shareholders' value will be protected thanks to a solid capital network that would be triggered at pre-defined (i.e. not liquidation) prices during the worst period of a crisis<sup>25</sup>. This would help to "break" correlations between the financial industry prices, thus making the volatility of the resulting quotations less volatile. If the "contagion effects" is under control, also the value of the potentially involved financial institutions are more protected and, hence, less volatile.

Greater importance is attached to the case of gradual deterioration anticipated by the market (this case is, among other things, dealt with in detail by the above mentioned literature). The loss of value of ordinary shares will induce the existing shareholders to follow a proactive approach in order to prevent the trigger activation and the consequent dilution. This would induce preventive capital strengthening, exactly along the lines desired by the regulators, the market and the real economy operators<sup>26</sup>.

The amount of shares issued could follow a distribution process similar to that proposed to set up the resolution fund. The risk related to the business models of the various groups could be estimated by starting from market data, as in the proposal for a "component VaR"-based contribution by Masera and Mazzoni

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<sup>25</sup> Moreover, this would favour clear, direct and prompt actions for acquiring a distressed actor by one or several competitors, as desirable by public authorities.

<sup>26</sup> Refer to Calomiris & Herring (2011), with a particular regard to the numerical example. Incisive considerations are also found in Sundaresan & Wang (2010).

(2010). As argued by Calomiris and Herring, a solution like this will require less capital than the individual equity enhancements.

Please note that the banks affected by the crisis have started to gather capital on the market amounting to approximately \$1.2 trillion at the end of 2010. A share circulation amounting to \$400 million US would have made it possible, at the time of the Lehman bankruptcy, instantly to convert an amount of resources equal to that already collected into ordinary capital, without having had to go the market and alter the operators' liquidity conditions.

The issue of these shares could take place more quickly than the collection of fresh capital, and it could also be greeted more positively by the market. In fact, convertible loan capital should be collected within an ordinary time period. Since a radical system of re-capitalization is not currently required, the SIFIs would also be less exposed to an "un-level competitive playing field" as compared to "non SIFI" institutions

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Return to the assessments already cited to estimate the volume of HT CoCos required for SIFIs to issue. The Banker data and some approximations regarding the necessary RWA, allows us to estimate that a circulation of €400 million of these shares could correspond to 10 percent of the post-Basel III capital for the world's 100 major banks (in terms of size), and equal to one fifth of the twenty most important ones.

### **5.1 BCBS observations on high trigger contingent convertible instruments**

The BCBS describes hybrid capital in the last document (BCBS, 2011b) as

Going-concern contingent capital is used here to refer to instruments that are designed to convert into common equity whilst the bank remains a going concern (i.e. in advance of the point of non-viability). Given their going-concern design, such instruments merit more detailed consideration in the context of the additional loss absorbency requirement. ....An analysis of the pros and cons of high-trigger contingent capital is made difficult by the fact that it is a largely untested instrument that could potentially come in many different forms.

Appendix 3 of the same document is devoted to analyzing CoCos' pros and cons. The same BCBS document determines that the high-trigger going-concern contingent capital has a number of similarities to common equity, like loss absorbency properties and pre-positioned features (allowing banks to avoid entering capital markets during a downturn and mitigating debt overhang problem and signalling issues). Furthermore these tools are pre-funded if banks sell securities to private investors. Benefits of going-concern contingent capital over common equity are then described (§ 85), and are mainly found in the benefits of an enhanced debt discipline on one side and shareholder discipline on the other side, given by the threat of the conversion of contingent capital when the bank's common equity ratio falls below the trigger. This discipline will manifest in a bank's maintaining a cushion of common equity above the trigger level, a pre-emptively issuing of new equity to avoid conversion, or managing "tail-risks" more prudently. Contingent capital holder's discipline is fostered too, because they may have an extra incentive to monitor the risks taken by the issuing bank due to the potential loss of principal associated with the conversion.

This advantage over common equity also depends on the conversion rate (as seen and discussed before following Calomiris & Herring's arguments). However, the conversion rate will need to be such that a sufficiently low number of shares are created upon conversion in order to ensure that the contingent capital holders suffer a loss from conversion. The conversion rate therefore determines whether the benefits of increased market discipline could be expected to be provided by the shareholders or the contingent capital holders; market information is also improved for both supervisors and for capital holders. Supervisors could thus better allocate their scarce resources and respond earlier to make particular institutions more resilient. Finally cost effectiveness could be reached because these tools may achieve an equivalent prudential outcome to common equity but at a lower cost to the banks, which will enable them to issue more capital as contingent capital than as common equity and thus increase their capacity to absorb losses. A lower cost requirement could also reduce the incentive for banks to perform regulatory arbitrage, either by transferring more risk to the shadow banking system or by taking on other risks that are not visible to regulators.

BCBS does, however, enumerate some potential shortcomings of going-concern contingent capital relative to common equity. The first is trigger failure. According with BCBS, the benefits of contingent

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<sup>27</sup> Because of the CoCos' legal profile, similar to a corporate bond, they contribute to the computation of the newly adopted liquidity ratios, in particular to the Net Stable Funding Ratio.

capital are only obtained if the instrument's trigger are well prior to the point of non-viability. Given that these are new instruments, there is uncertainty around their operation and whether they would be triggered as designed. In our opinion, giving the power to determine the conversion event to new RAs will solve BCBS's major implementation problem.

The second negative feature that BCBS mentions, concerns cost effectiveness. While the potential lower cost of contingent capital may offer some advantages, in fact, BCBS argues that the lower cost, if not explained by tax-deductibility or a broader investor base, may hide the fact that contingent capital is less loss-absorbing than common equity. A fixed maturity date and mandatory coupon payments prior to conversion, for instance, may undermine the ability of an instrument to absorb losses as a going concern. But if the trigger event is unique, lower-risk bank's securities carry a price premium from convertibility and therefore can be cost-effective without their having to resort to further enhancement from, for example synthetically engineered features that add attributes that in fact reduce their true loss-absorbing capacity. When a rating agency triggers conversion, the price will not dilute the existing shareholder base too much, but will punish the weakest banks, changing their shareholder base and laying foundations for deep changes to management.

These counter-arguments rebuff other proposed criticisms, for example that the new products will increase complexity and in so doing exacerbate systemic risk. If regulatory triggers are attributed to new RAs, the market will have little uncertainty about the price evolution of the new instruments and correspondingly about investor behaviour, particularly in the run-up to a stress event; thus the instruments will reduce ambiguity about capital structure and mitigate misperceptions of market participants.

A unique trigger event will also prevent so-called "death spirals" that the BCBS warns about, where a single firm's approaching the conversion point itself puts downward pressure on equity prices, due to the potential for dilution. This dynamic depends on the conversion rate, that could provide incentives for speculators to push down the price of the equity and maximize dilution. However, counter measures must be adopted, like a pre-determined mechanism to determine the conversion price, leaving little uncertainty about the ultimate creation and allocation of shares, and thereby reducing incentives to manipulate prices.

A unique trigger event for all the G-SIFIs could also help to counter the objection about "adverse signalling". Banks will want to avoid triggering conversion of contingent capital. When the trigger event depends only on an individual bank's distress, banks are more susceptible to the risk that there will be an adverse investor reaction if the trigger is hit. They may in fact create financing problems and undermine the markets' confidence in the bank and other similar banks in times of stress, thus embedding a new type of "event risk" in the market. But, putting all the G-SIFIs in the same situation could avoid a strategy to weaken the already weak banks, pushing them to the resolution point. The same argument refutes the suggestion that CoCos induce so-called "negative shareholder incentives" by creating the prospect for punitive dilution and potentially distorting shareholder and managerial incentives. Confronted with the unique trigger event (the same for each institution), G-SIFIs are pressured to maintain a cooperative position in times of crisis. An implicit stability net supplied by G-SIFIs as a whole could prevent "wrong way" behaviour like the sharp scaling back of risk-weighted assets via lending reductions or assets sales, which have potentially negative effects on financial markets and the real economy. At the same time, the same stability net could curb the temptation to "gamble for resurrection" since distressed institutions will anticipate that losses incurred after the trigger point would be shared with investors in converted contingent instruments, who will not share the gains from risk-taking if the trigger point is avoided.

Surely more work is needed to understand, in a game theoretic perspective, all the potential circumstances enumerated, but now is the time to take advantage of the BCBS's open-minded stance:

The Group of Governors and Heads of Supervision and the Basel Committee will continue to review contingent capital, and support the use of contingent capital to meet higher national loss absorbency requirements than the global requirement, as high-trigger contingent capital could help absorb losses on a going concern basis.

## **6. Systemic risk in the "new normal"**

Financial crisis is a highly negative-sum outcome for all of the economic (and, in general terms, social) agents involved, even for those who have neither participated actively in the preceding game, nor gained access to the advantages it offered. Within such a framework, regulations will provide value that can be measured and distributed among the agents themselves.

SIFIs were at the core of the turbulence, playing significant roles (in some cases, leading ones) within risky markets, by intermediating a huge amount of resource transfer, as well as controlling an

intrinsically global system in terms of investment, sources and the applications of funds, risk management and capital flows. Based on these characteristics, multilateral institutions such as the IMF could introduce into the Global Financial Stability Net, recently defined by the IMF itself (2011b) as a network of country insurance and lending instruments, regional and national (both domestic- and foreign-oriented) facilities to cope with excess volatility and systemic contagion in times of crisis.

Current popular sentiment seems to suggest that the public will be reluctant to accept further efforts to support the financial sector. A future crisis will not be faced in the same way as the last was; SIFI's daily decisions will reflect this information, as will their formal documents dealing with planning, risk monitoring and strategic medium-term vision. Critically, this problem of managing medium-term goals and financial industry stability objectives remains in the background. Accounting rules, market pressure and investor's expectations play a crucial role and very little seems to have changed about them since before the crisis. Time will tell whether the combination of measures taken so far will suffice or whether more incisive action will be needed to ensure a "virtuous" development of the international financial business system. The next crisis, scheduled for 2015 (Oliver Wymann, 2011), according to a leading business firm as well as a number of experts, would seem to require as much.

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## Appendix: Risk and Capital in a potential SIFI credit portfolio

Computations are based on CDS 5 years spreads observed on liquid markets as from Bloomberg data base. The sample (called here portfolio) is composed of 41 European large banks. Observations are collected from January 2004 to September 2010.

CDS implied default probability (PD) is determined from<sup>28</sup>:

$$PD_{\text{market implicit}} = \text{CDS}_{\text{spread}} / (\text{LGD}\% + \text{CDS}_{\text{spread}})$$

For the sake of simplicity credit loss given default (LGD) is assumed to be exogenous and constant. LGD is measured as the S&P's average loss rate incurred by the issues of senior unsecured banks between 1981 and 2009<sup>29</sup>. Individual PD is computed daily as a recursive moving average of the last five working days (London calendar). The portfolio is composed of 41 equally weighted investments in European large banks' equities. The reason for this choice is that we are interested in what happens in the event of one large bank's default and not in the portfolio performance per se. Hence each bank is equally relevant with respect to examining the joint default probability. Default correlation is computed according to the so called "Gupton Formula"<sup>30</sup> as:

$$\text{STD}_{\text{observed}} / (\text{PD}_{\text{average}} - \text{PD}_{\text{average}}^2)^{0.5}$$

in which STD is the standard deviation of individual PDs. The STD is computed on five days overlapping period, as the PDs are<sup>31</sup>.

To take into account the small number of banks in the portfolio, default correlation is granularity adjusted, ideally representing a fully diversified portfolio<sup>32</sup>. Economic capital is computed adopting a closed-form parametric formula; case a daily re-estimated Beta one<sup>33</sup>, based on above mentioned parameters (PD, LGD rate, default correlation) in % of EAD.

Economic capital is assessed as VaR at 99% statistical confidence level; this interval is considered coherent with periods of extreme distress, close to market disruption, as stated by the Basel Committee of Banking Supervisors (BCBS<sup>34</sup>).

In figure 5 regulatory capital is also showed, applying the Basel II Standardized Approach coefficients, according with the individual banks' official pro tempore ratings (source S&Ps). Starting from these risk measures, joint default probability is computed, as is the number of defaults expected, conditional to one bank's default. This probability is derived from the default correlation as follows. In a binomial distribution correlation can be written as

$$\rho_{\text{default}} = \frac{p_{1,2} - p_1 p_2}{\sqrt{p_1(1-p_1)} \times \sqrt{p_2(1-p_2)}}$$

<sup>28</sup> R.J. Grossman, M. Hansen (2010), CDS Spreads and Default Risk. Interpreting the Signals, Working Paper, Fitch Ratings, 12 October, New York.

<sup>29</sup> D. Vazza, D. Aurora, N. Kraemer (2010), Default, Transition, and Recovery: 2009 Annual Global Corporate Default Study And Rating Transitions, Global Fixed Income Research, S&Ps.

<sup>30</sup> J.P. Morgan, (1997), Creditmetrics Technical Document, April, available on the website. See also Hansen M., Ramadurai K., Van Vuuren G., Mitropoulos A., Scott G. (2011), Basel III Correlations: An Empirical Analysis Reflecting the Financial Crisis, Fitchratings Special Report, November, pages 7-9.

<sup>31</sup> This method is only preliminary, but it is convenient for the illustrative purpose. To be more rigorous see for instance Segoviano Miguel A., Goodhart Charles (2009), Banking Stability Measures, IMF Working Paper, January.

<sup>32</sup> Depending on the granularity of the data set used, the standard deviation of loss rates might embed a degree of undiversified idiosyncratic risk. The STD in this case will implicitly reflect exposure to both idiosyncratic and systematic risk factors. Using a relatively small data set (like ours) one can potentially estimate empirically higher correlations relative to using a larger, more diversified one. Thus, our computations represents a departure from the fully diversified correlation (i.e. systemic risk)..

<sup>33</sup> This distribution is completely characterized by two parameters,  $\langle \hat{L} \rangle$  and  $\hat{\sigma}_L$ , which are easily obtained from the population mean ( $\hat{L}$ ) and standard deviation ( $\hat{\sigma}_L$ ) of the losses.

<sup>34</sup> BCBS, Principles for sound stress testing practices and supervision, 2009.

in which  $p_1$  and  $p_2$  are individual default probabilities for item 1 and 2 respectively while  $p_{1,2}$  is the joint default probability.

When we observe a population with the same default probability, it happens that  $p_1 = p_2 = p_{average}$ , therefore

$$p_{1,2} = p_{joint\ default} = \rho_{default}(p_{aver.} - p_{aver.}^2) + p_{aver.}^2 = \rho_{default}p_{aver.} + (1 - \rho_{default})p_{aver.}^2$$

This relation is also valid in a population of  $n$  components and allows us to determine the joint default probability from the empirical data.

We will use the following shorthand notation: EL will stand for Expected loss and UL for Unexpected loss. The probability density function can be interpolated by a statistical Beta function<sup>35</sup>. Parameters are computed as follows:

$$\beta = \frac{EL(1-EL)^2}{UL^2} + EL - 1 \quad \alpha = \frac{EL^2(1-EL)}{UL^2} - EL$$

Economic capital is then determined as the number of UL needed to reach a pre-defined statistical confidence level (one tail): economic capital =  $k$  UL in which  $k$  is called capital multiplier. Then, setting

$$\Pr[\text{Loss} > (EL + \text{capital})] = \text{probability}_{target} = q$$

the credit loss beyond the target probability is given by the cumulative Beta inverse operator:

$$\text{economic capital} = \text{Beta}^{-1}[q; \alpha, \beta]$$

Following the regulatory approach, economic capital showed in figure 5 is net of EL, and, therefore

$$\kappa = \frac{\text{Beta}^{-1}[q; \alpha, \beta] - EL}{UL}$$

The confidence level is set at 99%, which is the accepted level under stressed times.

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<sup>35</sup> O. Renault, A. De Servigny (2004), Measuring and managing credit risk, McGraw-Hill, chapter 6.