Defining financial stability and a framework for safeguarding it

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Introduction and motivation

The ongoing global financial crisis has been a rude awakening that we do not yet have a reliable, effective framework for safeguarding financial stability. The threats to global economic stability caused by the dysfunctioning of credit and money markets and the weakening and instability of the global banking system also makes clear that safeguarding financial system stability is as important a policy objective as maintaining monetary stability if economic growth and stability are to be achieved and sustained.

As important as the global financial industry has become in terms of its measured value added to global production and employment, global finance is not an end in and of itself. It is, instead, a means to enhancing and facilitating the efficiency of economic processes such as resource allocation, risk allocation and pricing, wealth accumulation, and ultimately economic growth and prosperity. It is obvious from the massive and destructive deleveraging that is underway that the global financial industry en masse has been missing this point for quite some time – as if finance existed for the benefit of highly paid financiers and outsized rates of return. However, much of the virulence of this crisis could not have occurred without the policy shortcomings and mistakes that inadvertently either encouraged or acquiesced to excessive risk taking and the accumulation of imbalances. Playing key roles in this regard were misaligned private incentives, ineffective regulations and business practices (or rules of the game), and inadequate official oversight of financial institutions and markets – not to mention over expansionary global monetary and global macroeconomic policies.

It is appropriate to conclude that the financial-system policy framework in place prior to the crisis – which has already been transformed significantly in the United States and Europe – failed dramatically. This framework was a patchwork of rules of the game and regulatory and supervisory principles and institutions that emerged in the aftermath of the

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Great Depression and which, since then, has evolved in response to repeated but individually unique experiences of economic cycles of growth and recessions, financial cycles of boom and bust, and dramatic and at times system transforming financial innovation. In effect, the policy apparatus for safeguarding financial stability did not keep pace with financial innovation, modernization, and globalization and failed to prevent financial imbalances from arising, accumulating, and compounding – to the point of a global systemic financial crisis and quite possibly the worst global economic crisis since the 1930s.

With the benefit of hindsight – which policy makers clearly do not have in real time – the resulting framework relied too heavily (and naively) on private risk management and market discipline to safeguard financial stability and not enough on appropriate incentives, effective rules of the game, and well designed and rigorously implemented official oversight. It is natural and likely that the balance of emphasis of policy will swing in the direction of realigning private and public incentives, redesigning new rules of the game appropriate for a modern global financial system, and enhancing significantly the reliance on official oversight through improved supervision of institutions and surveillance of markets. Hopefully these efforts will also include reforms to enhance financial reporting, disclosure, and market transparency in an effort to improve the effectiveness of market discipline in preventing the build up of catastrophic financial imbalances.

In going forward, a prerequisite for more effective official oversight is the development and implementation of a more effective framework for assessing the ability of the financial system to perform its key economic functions.[2] However, the ultimate objective of promoting efficient finance and of safeguarding financial stability once it is achieved is sustained economic growth, stability, and prosperity. From this perspective, it is difficult to envision any policy framework being effective for safeguarding financial stability if it does not place these core objectives front and center including in the very definition of what is meant by the now ubiquitous expression 'financial stability.'

With this as background, the purpose of this paper is twofold: first, to discuss a definition of financial stability and a framework for policy analysis more closely aligned with economic processes and efficiency; and second to examine the implications and challenges for assessing systemic risk and safeguarding financial-system stability. The definition links the effectiveness of finance and the financial system to its ability to facilitate the efficiency of economic processes such as wealth accumulation, economic growth, and economic efficiency more generally, as well as risk pricing and management. This means that assessing the stability of the financial system would become a vital part of evaluating the stability of

[2] The key functions include matching the needs of savers and investors; providing transactions and payments services; risk pricing, spreading, sharing, and management; and the production, processing, and monitoring of information.

the economy more generally and the appropriateness of microeconomic as well as macroeconomic policies. Of course, this makes assessing financial stability perhaps even more challenging than assessing the potential for instability. But this way of framing the intermediate objective of safeguarding financial stability at least offers the possibility of designing policies that proactively promote economic efficiency and health. This more positive and proactive disposition could reap benefits in terms of warding off the accumulation of the kind of financial imbalances that could threaten financial stability.

The paper is organized as follows. The next section of the paper briefly discusses the existing framework of prevention and resolution of financial instability. It is framed as relying heavily on lines of defense against financial instability, almost as if finance were some kind of disease. It is obvious that all of the existing lines of defense failed to prevent the subprime crisis from occurring and, importantly, from spreading to all other international financial centers. The paper then motivates a definition of financial stability and relates it to economic processes and economic efficiency. In this section it is suggested that, unlike in theoretical micro- and macro-economic analysis, that the concepts of financial efficiency and economic stability cannot be separated so clearly, in part because finance is not an end but a means to promoting economic efficiency, growth, and stability. If finance is ineffective and prone to repeated systemic booms and systemic busts, it is unlikely to promote intertemporal economic efficiency and may even promote intertemporal inefficiency, as we seem to be witnessing now in the ongoing global crisis. The paper then goes on to discuss some of the more important challenges in assessing financial stability in an effort to safeguard the financial system from potential financial imbalances. An implication of the analysis is that intertemporal efficient wealth accumulation and growth can only be safeguarded with a financial stability framework that incorporates and integrates important elements of economics and finance, both at the macro and micro levels.

Existing policy framework

The existing policy framework for safeguarding financial stability has evolved through time based in part on the realizations that finance is subject to market imperfections and is a public good. This framework has been often portrayed in officialdom as a series of lines of defense against financial imbalances that could arise, and have arisen often enough, from underlying structural market imperfections and unexpected shocks. The lines of defense have been designed to prevent imbalances from becoming systemic and to resolve systemic difficulties should one or more of the defenses be breached. This section briefly summarizes the existing framework within the context of cross border finance although the framework presented is also a reasonable characterization of existing national and regional frameworks in advanced countries and the major international financial centers.

Policy issues and concerns

At the global level, the channels through which financial instability can be transmitted from one country to another can usefully be classified into three broad categories: institutions, markets, and infrastructures. This triad, together with legal and monetary arrangements, and business practices and codes of conduct, are a reasonable way of defining what is normally meant by the term 'financial system', which will be discussed more fully later. Cross-border linkages of components of this triad can be seen as constituting the main channels through which problems in one national financial system get transmitted to another one. In addition to these financial channels, the global economy is probably the most basic and prevalent cross-border transmitter of economic or financial weaknesses, but this is the purview of macroeconomists and macroeconomic policymakers and will not be discussed in this paper.

To provide context, Table 1 summarizes some public-policy issues and concerns around which the existing policy framework has evolved. Roughly speaking, the issues involve one or more market imperfections (or market failures). Three broad global policy issues arise to varying degrees from cross-border banks, FX and other global markets, and unregulated entities, such as hedge funds, SIVs, and other special purpose vehicles: protecting investors and markets, dealing with safety net issues and moral hazard, and assessing and mitigating cross-border and systemic risk. All three issues are very important for banks generally and cross-border banks in particular. They are all also important for global markets. Investor protection and safety net issues are seen widely as not being relevant for unregulated entities, while the most recent crisis clearly indicates that unregulated entities can pose systemic risk.

Table 1. Public Policy Issues and Concerns

Policy Issues and Concerns	Policy Domain of Cross-Border Systemic Concern		
	Cross-Border Institutions	Global (FX) Markets	Unregulated Activities
Investor Protection/ Market Integrity?	Investor Protection	Market Integrity	No; Possibly for Retail Investors (of funds of funds)
Moral Hazard from Safety Net?	Yes; and Home/Host Burden Sharing Issues	Possibly from G-3 Central Bank Liquidity	No
Cross-Border and Systemic Risks?	Maybe; Depends on Size, Complexity, etc.	Yes, via OTC markets and infrastructure linkages	Yes?, via opacity, complexity, and w/ institutions and markets

Policy framework

Taking this classification as given, how are these risks and public policy concerns addressed through financial policies? That is, to what extent are the tools of financial policies used to address these concerns? Table 2 is one, perhaps exaggerated way of answering this question.

Table 2. Oversight Regimes

Lines of Defense	Policy Domain of Cross-Border Systemic Concern		
	Cross-Border Institutions	Global (FX) Markets	Unregulated Activities
Market Discipline	Partial	Primarily	Exclusively
Market and Banking Regulation	National with cooperation	Not really; over-the-counter transactions	No
Prudential Supervision	National and Home/Host Issues	n.a.	No
Market Surveillance	Indirect, as participant	Direct; National and International	Indirect, as participant

As indicated in the first column of the Table, large cross-border banking groups – including the large internationally active banks – are probably the most closely regulated and supervised organizations on the planet, and for good reasons.

- These institutions pose financial risks for depositors, investors, markets, and even unrelated financial stakeholders because of their size, scope, complexity, and of course their risk taking.

- Some of them are intermediaries, investors, brokers, dealers, insurers, reinsurers, infrastructure owners and participants, and in some cases many of these in a single complex institution.

- They are systemically important: all of them nationally, many of them regionally, and about twenty or so of them globally.

- Protection, safety net, and systemic risks issues are key pubic policy challenges.

- Oversight occurs at the national level, through both market discipline and official involvement, and at the international level through committees and groups.

As a result, banks generally, and cross-border and global banks are probably the most closely watched financial institutions in the world.

At the other extreme of regulation and supervision are unregulated entities, as can be seen in the right-most column of Table 2.

- They are neither regulated nor supervised. Many of the financial instruments – OTC derivatives for example – these unregulated entities use strategically and tactically are not subject to securities regulation and the markets in which they transact are by-and-large the least regulated and supervised. This is part of the investment strategy and it defines the scope of profit making.

- Unregulated entities (such as hedge funds and certain kinds of SIVs) are forbidden in some national jurisdictions. In jurisdictions where they are partially regulated, this is tantamount to being forbidden – given the global nature and fungibility of the hedge-fund business model.

- Market activities of unregulated entities are subject to market surveillance just like other institutions, but this does not make transparent who is doing what, how they are doing it, and with whom they are doing it.

- Investor protection is not an issue for most individual unregulated entities, as they restrict their investor base to institutions (pension funds, insurance companies, hedge funds) and wealthy individuals willing to invest in relatively high minimum amounts.

- Probably beginning with the Asian crisis and then LTCM, and intensifying with the their tremendous growth over the past several years, hedge funds are increasingly being seen as potentially giving rise to systemic risk concerns, a theme I will return to later.

- Regarding hedge funds, investor protection is increasingly becoming an issue with the advent of funds-of-hedge-funds that allow minimum investments of relatively small amounts less than $100,000 or even less than $50,000 in hedge funds.

Global markets fall in between being and not being regulated and supervised. What is meant by global markets? Examples are, the FX markets and their associated derivatives markets (both exchange-traded and over-the-counter) and the G-3 fixed-income markets as well as others associated with international financial centers (pound, Swiss franc, etc) as well as their associated derivatives markets. Dollar, euro, and yen government bonds are traded more-or-less in a continuous global market, and the associated derivatives activities are also global.

Global markets are only indirectly regulated. They are subject to surveillance through private international networks and business-cooperation agreements, through information sharing by central banks and supervisory and regulatory authorities, and through official channels, committees, and working groups. Parts of these markets are linked to national clearance, settlement, and payments infrastructures, so they are also subject to surveillance through these channels. The risks they potentially pose are less of a concern to the extent that the major players in them – the large internationally active banks – are supervised and market-disciplined by financial stakeholders. If there is poor oversight of the major institutions, then these global markets are subject to considerable risks, including a greater likelihood of systemic risk. One obvious example would be the global over-the-counter derivatives markets, which are unregulated have little oversight except through the regulation and supervision of the institutions that engage in the bulk of these markets' activities. Both investor protection and systemic risk are challenging public-policy issues for these markets.

Regarding infrastructure, large internationally active institutions typically are major participants in domestic and international clearance, settlement, and payments infrastructures – both public and private – as well as the major trading exchanges. Many of them co-own parts of the national and international infrastructures and have a natural interest in their performance and viability. Incentives are to some extent aligned to achieve both private and collective net benefits. Increasingly, however, internationally active banks have been more heavily involved in over-the-counter (OTC) transactions, which do not pass through these infrastructures. This poses systemic risk challenges many of which have surfaced dramatically in the ongoing global financial crisis.

Lines of defense against systemic risks and events

As the rows of Table 2 make clear, this framework relies on four lines of defense for preventing problems from occurring and/or becoming systemic and for dealing with them when they do become systemic (nationally, regionally, and globally). These can be roughly categorized as: private risk management; market discipline; official oversight; and crisis management and resolution mechanisms. Important aspects of each of them are summarized below.

Private risk management:

- Financial-risk management at business-line levels
- Enterprise risk management at firm level
- Management controls at executive and senior-management
- Corporate governance at Board level
- Self-regulation via development/promotion of best business practices

Market discipline

- Sound accounting and valuation procedures for properly recording and valuing financial transactions/statements
- Timely reporting and disclosure to allow investors to assess risks
- Well functioning markets for price discovery and resource and risk allocation
- Legal infrastructure for enforcement of financial contracts

Public sector oversight

- Transparent and enforceable legal infrastructure
- Effective market regulation and surveillance
- Effective oversight of financial institutions
    - Banks most heavily regulated/supervised
    - Investment banks subject to SEC regulations
    - Insurance/reinsurance lightly regulated
    - Others institutional investors lightly regulated
    - Unregulated activities

Crisis management and resolution mechanisms

- Deposit insurance protection to prevent bank runs
- Appropriate liquidity provision by central bank to keep markets smoothly functioning
- Lender of last resort operations to prevent market dysfunctioning and illiquid but viable financial institutions from failing
- Capital injections (private preferred to public) to maintain orderly transitions for institutions that are not viable

In almost all cases and line items in the above summary of lines of defense, the ongoing global crisis triggered by the US subprime crisis occurred because most if not all of these lines of defense failed in significant ways. The implementation of this framework – whose aim is to prevent instability – has not been successful in preventing the kind of imbalances from arising that created systemic risk and systemic events. Moreover, the advanced-country central banks and fiscal authorities, and in many cases the legislators, had to become innovative in creating new tools and the financing to support them to prevent further damage both to financial systems and economies. Additional, perhaps even more innovative reforms and policy tools may be required to regain economic and financial stability.

In the breach – characteristics of the current global financial crisis

Although the crisis was triggered by the U.S. subprime mortgage crisis and housing market booms/bubbles in European countries, there are many factors that contributed to the crisis have been vetted in official analysis and widely discussed in the press but that will only be mentioned here. These factors include excessive credit expansion and leverage, lax

lending standards, and ineffective official oversight of key markets and participant institutions. The main features of the crisis can be briefly listed as follows:

- Dysfunctional markets for liquidity and their supporting derivatives markets, reflecting an underlying breakdown of trust in systemically important counterparty relationships among the large global active financial institutions
- Dysfunctional credit markets and their surrounding derivatives markets, which create further pressures in markets for liquidity, which further increase the intensity of underlying creditworthiness issues
- Growing perceptions of increasing risks of a prolonged and possibly deep US and global economic recession
- Loss of control of monetary and financial conditions by key central banks in the major international financial centers, thereby reducing their ability to exercise their policy instruments to safeguard both monetary and financial stability
- Innovative policy changes including
    - Use of existing facilities in new ways (extended terms and access)
    - Extended facilities to nonbank financial intermediaries
    - Other innovations
- Coordinated actions by advanced country central banks
- Official financial support to both bank and nonbank financial institutions in the United States and Europe
- US Treasury led legislative imitative to remove toxic assets and recapitalize weak systemically important institutions; many details unresolved.

The bottom line of this list of features and responses is that the existing policy framework – comprised of relying on a balance of market discipline and official oversight – failed to prevent the imbalances from arising. Moreover, the existing mechanisms for resolving problems from becoming systemic proved to be inadequate. In effect, all lines of defense failed to prevent a relatively small financial problem from becoming systemic in part because other lines of defense failed to prevent earlier on the buildup of overwhelming and unsustainable imbalances in credit markets, including massive, opaque, highly-leveraged, and essentially unregulated financial structures and securities.

Policy makers are continuing to innovate to create new mechanisms to contain systemic risk and restore confidence and both economic and financial stability. Ultimately, they will need to create a new policy framework and a more sustainable financial-system architecture (which has already begun in the United States) to restore and safeguard financial stability.

Financial stability as the objective [3]

An important prerequisite for success in safeguarding financial stability in the future is the development of an intellectual framework that perceives the safeguarding of financial stability as a policy objective that is on a par with monetary stability, which has been perceived for several decades as a key prerequisite for sustaining durable economic growth and economic stability more generally. An important component of this new intellectual framework will no doubt be the enhanced ability to assess whether the financial system is capable of continuing to perform its main financial and economic functions in the presence of sizable unexpected shocks. Designing a framework for making assessments of this kind must to some extent be grounded in a practical conception of what is meant by financial stability and the ability to sustain it. To be useful for assessing the potential for systemic risk and events, the definition and framework must link the performance of the financial system to its ability to facilitate continued economic growth and stability. In short, the framework for assessing financial stability must do so by assessing the potential impact of financial vulnerabilities on the real economy. The existing frameworks used to do this prior to the current crises clearly failed to provide early warnings of the impending financial dysfunctioning and its potential impact on the US and global economies. The time is ripe for brainstorming and fresh thinking.

One reason why policy makers and academics have relied on concepts of financial instability rather than financial stability is that it is difficult to define what is meant by financial stability. Why? One reason is that stability is a difficult concept to define for an evolving innovating organic entity such as a financial system, one that is constantly transforming itself. It is also difficult to define stability because it is difficult to define what is meant by equilibrium in finance, because equilibrium prices and resource allocations today depend on expectations of future outcomes and expectations can be highly volatile if not unstable. It is also difficult to define because the essence of a financial transaction is an IOU or a promissory note involving human trust – the very kind of trust that policymakers were trying to restore in October 2008. This section tries to motivate and examine a definition of financial stability that has the potential for helping us safeguard financial stability.

Conceptual Challenges

Public policy typically tries to mitigate the impact of efficiency losses associated with market imperfections. In finance, however, each and every loss of efficiency does not necessarily require intervention. The desirability or necessity of some form of collective

[3] This section is based on material in Schinasi (2006), Fell and Schinasi (2005), and Houben, Kakes, and Schinasi (2004). I am grateful to my coauthors and to the UK National Institute Economic Review for granting permission to use all or part of this material.

intervention is much clearer when a market imperfection in finance leads to an inefficiency that poses a significant threat to financial stability, because of the impact on either financial institutions or markets or both.

Unfortunately, the financial-system policy literature rarely makes a clear distinction between sources of market imperfections that threaten stability and those that do not. This is because it is difficult to measure the efficiency losses associated with market imperfections in finance and to assess the risks to financial stability associated with market imperfections. These are some of the challenges in the period ahead, for which an analytical framework for financial stability would be useful for policy purposes. But this, too, is an enormous challenge as is discussed in this section.

The Financial Stability Challenge

There are many ways in which to characterize the challenges faced in achieving and maintaining financial stability. Moreover, the nature of the challenge will depend to some extent on the structure and maturity of the economic system. For mature financial systems, the financial stability challenge can be characterized as:

> *maintaining the smooth functioning of the financial system and its ability to facilitate and support the efficient functioning and performance of the economy*.

To achieve financial stability, it is necessary to have in place mechanisms designed

> *to prevent financial problems from becoming systemic and/or threatening the stability of the financial and economic system, while maintaining (or not undermining) the economy's ability to sustain growth and perform its other important functions.*

The challenge is not necessarily to prevent all financial problems from arising.

- First, it is not practical to expect that a dynamic and effective financial system would avoid instances of market volatility and turbulence, or that all financial institutions would be capable of perfectly managing the uncertainties and risks involved in providing financial services and enhancing financial stakeholder value.

- Second, it would be undesirable to create and impose mechanisms that are overly protective of market stability or overly constraining of the risk-taking of financial institutions. Constraints could be so intrusive and inhibiting that they could reduce the extent of risk-taking to the point where economic efficiency is inhibited. Moreover, the mechanisms of protection or insurance could, if poorly designed and implemented, create the moral hazard of even greater risk taking.

Maintaining the economy's ability to sustain growth and perform its other important functions is an important aspect of the challenge of financial stability. The achievement and maintenance of financial stability should be balanced against other and perhaps higher-priority objectives such as economic efficiency. This reflects the notion that finance is not an end in itself but plays a supporting role in improving the ability of the economic system to perform its functions.

That the challenge is a balancing act can be seen by considering that the likelihood of systemic problems could be limited in practice by designing a set of rules and regulations that restrict financial activities in such a way that the incidence or likelihood of destabilizing asset price volatility, asset market turbulence, or individual bank failures could be eliminated. But it is also likely that this type of 'stability' would be achieved at the great expense of economic and financial efficiency.

Stability and efficiency can not be so neatly separated.

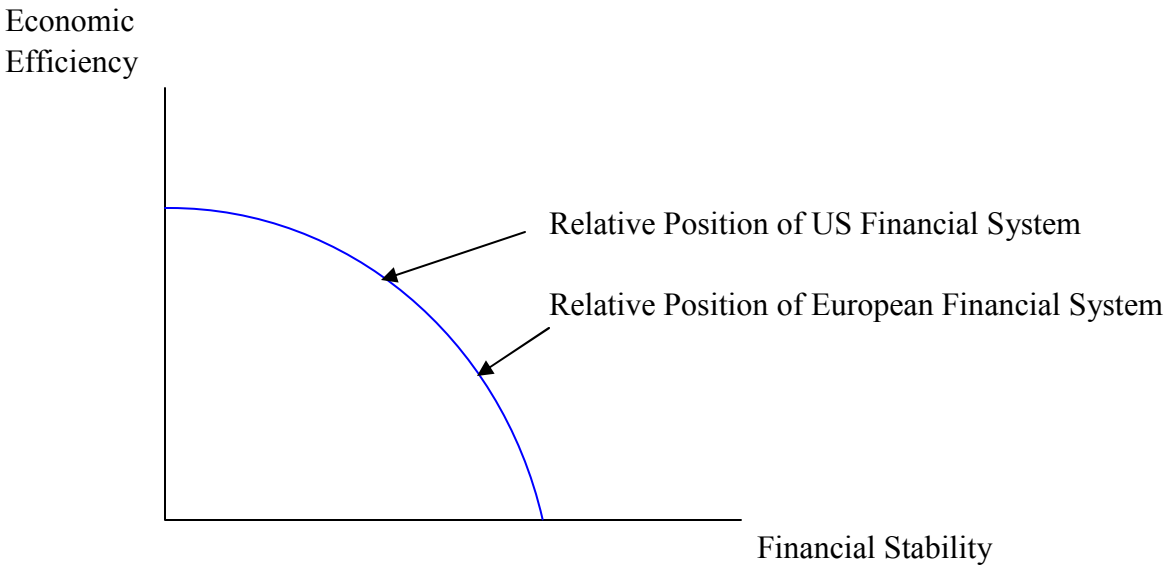
This reasoning leads to the impression, if not conclusion, that there is an *ex ante* trade-off between achieving on the one hand economic and financial efficiency and on the other economic and financial stability. That is, if one is concerned solely with stability, then it may be possible to achieve and maintain it by trading off some efficiency.

The possibility of an *ex ante* trade-off can be illustrated by narrowing the definitions of stability and efficiency. Consider a market for a good whose price is sensitive to incoming information, a characteristic of many asset markets. In principle, on could limit the variability of the asset price by imposing restrictions in the market that would inhibit the ability of traders to price-in every small piece of information. But from a trader's and investor's perspective, such restrictions would inhibit the efficiency of the market's ability to price and allocate resources in the presence of uncertainty.

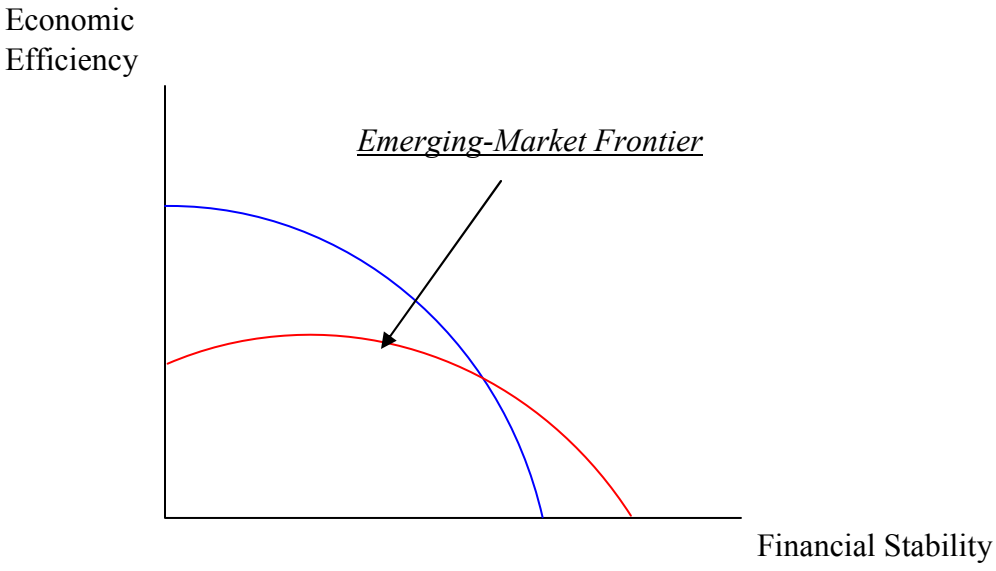
On the other hand, it is possible to try to maintain efficiency, and even enhance it, while still allowing the financial system room to innovate, evolve, and better support the economic system. If the cost of doing so is greater asset price volatility or capital flow volatility, it is up to society to choose a point along this continuum of trade-offs (Figure 1).

Figure 1.

Mature Financial System Efficiency and Stability Frontier



Emerging-Market Financial System Efficiency and Stability Frontier



Some have characterized the difference between the American financial system and the European financial system as choices of different points along this continuum of trade-offs. The American system is more market oriented in that the financing of both household and corporate activities is accomplished more through markets than in Europe, where there is much greater reliance on bank funding and less reliance on tradable securities (although this is changing in Europe). While one might argue that the American system of finance has led to greater economic productivity and efficiency, this greater efficiency is accompanied by greater asset market volatility and turbulence, and a greater observed propensity to financial stress.

From a broader perspective, the challenge of achieving and maintaining financial stability goes well beyond the stability of asset prices, or prices generally. This is not to say that authorities, and central banks in particular, should not be concerned with asset price volatility, and price volatility more generally, because they determine the value of money. Instead, the challenge of financial stability is broader than, and in fact encompasses, the need to limit the impact of price instability on the functioning of the overall financial system. In fact, if the financial system is stable, it will be able to tolerate higher levels of asset price volatility as well as other financial problems, including weaknesses in financial institutions.

At the highest level of generality, one can see that the challenge of safeguarding financial stability is to have in place a framework for managing the risk of a system-wide problem. There is as yet no international agreement on what such a framework might be, and policy makers always seem to be trying to prevent the last crisis. In other words, there is much work yet to be done to establish an agreed and flexible framework for safeguard financial stability against the kind of imbalances that surfaced last summer and that led to the ongoing global systemic crisis.

Required Conceptual Elements of a Framework?

A financial system performs several key functions that foster and support the effectiveness of the real economy: matching savers with investors; pricing and allocating financial resources and risks; facilitating in a sustainable way various intertemporal economic processes such as wealth accumulation, economic growth, and social prosperity.

It is difficult to justify reasonably and practically an operationally useful definition of financial stability and a framework for safeguarding it that does not acknowledge and incorporate these key functions as core elements. Nevertheless, the economics and finance professions – both policy oriented and academic – have yet to form a consensus on either a definition or a conceptual framework for formulating financial system policies. This section addresses these and related issues by discussing the important conceptual elements that could usefully help the professions safeguard financial stability. The discussion necessarily entails defining terms and examining their implications.

Towards a framework

A framework for financial stability can best be understood as a set of definitions, concepts, and organizing principles that impose discipline on the analysis of the financial system. An important component of a framework for safeguarding financial stability is the early identification of risks and vulnerabilities that might threaten the maintenance of stability.

An effective framework would seem to require three important standards. First there must be rigorous definitions and understandings of key concepts, such as what is meant by the terms financial system, financial stability and instability, and systemic, just to name a few. Second, to be most useful for monitoring and policy, the framework's concepts and definitions ultimately must be either directly measurable or correlated with measures: in other words the concepts and definitions must have useful and policy relevant empirical counterparts. Third, the set of definitions, concepts, and organizing principles along with their empirical counterparts must serve the purpose of ensuring internal consistency in the identification of sources of risks and vulnerabilities and in the design and implementation of policies aimed at resolving difficulties should they emerge.

It is important to define appropriately the relevant concepts, especially what is meant by financial stability, the financial system, and systemic risk.

Defining 'financial system'?

Broadly, the financial system can be seen as comprised of three separable but closely related components. First there are financial intermediaries that pool funds and risks and then allocate them to their competing uses. Increasingly, financial institutions provide a range of services and not just traditional banking services of taking deposits and making loans. Now institutions such as insurance companies, pension funds, hedge funds, and financial-nonfinancial hybrids (such as General Electric) supply a range of financial services. Second, there are financial markets that directly match savers and investors, for example through the issuance and sale of bonds or equities directly to investors. Third, there is the financial infrastructure, comprised of both privately-and publicly-owned and operated institutions – such as clearance, payment, and settlements systems for financial transactions – as well as monetary, legal, accounting, regulatory, supervisory, and surveillance infrastructures.[4]

Notably, both private and public persons participate in financial markets and in vital components of the financial infrastructure. Governments borrow in markets, hedge risks, operate through markets to conduct monetary policy and maintain monetary stability, and

[4] On the role of the legal system see for example, Levine (1999), Leahy and others, and Beck and others.

own and operate payments and settlement systems. Accordingly, the term 'financial system' encompasses both the monetary system with its official understandings, agreements, conventions, and institutions as well as the processes, institutions, and conventions of private financial activities.[5] Any analysis of how the financial system works and how well it is performing its key functions requires an understanding of these components.

From this definition, one could reasonably expect that financial-stability and monetary-stability considerations are related in some meaningful ways. These relationships will become more transparent in what follows.

Defining 'financial stability'?

There is as yet no widespread agreement on a useful working definition of financial stability. Some authors define financial instability instead of stability,[6] and others prefer to define the problem in terms of managing systemic risk rather than as maintaining or safeguarding financial stability.[7] Consistent with some aspects of these alternative definitions, Schinasi (2004b and 2006) proposes and analyzes a definition of financial stability that has three important characteristics.

- First, the financial system is efficiently and smoothly facilitating the inter-temporal allocation of resources from savers to investors and the allocation of economic resources generally.
- Second, forward-looking financial risks are being assessed and priced reasonably accurately and they are also being relatively well managed.
- Third, the financial system is in such condition that it can comfortably if not smoothly absorb financial and real economic surprises and shocks.

If any one or a combination of these characteristics is not being maintained, then it is likely that the financial system is moving in the direction of becoming less stable, and at some point might exhibit instability. For example, inefficiencies in the allocation of capital or shortcomings in the pricing of risk can, by laying the foundations for imbalances and vulnerabilities, compromise future financial system stability.

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[5] This particular formulation is an adaptation of 'international financial system' in Truman (2003).

[6] See for example the definitions of Chant et al (2003) , Crockett (1996), the Deutsche Bundesbank (2003), Duisenberg (2001), Ferguson (2002), Foot (2003), Large (2003), Mishkin (1999), Norges Bank (2003), Padoa-Schioppa (2003), Schwartz (1986), and Wellink (2002) that are surveyed in Schinasi (2004b and 2006). Davis (2002) develops a typology of instability.

[7] From a policy perspective, a positive approach focusing on financial stability is more useful than a negative one focusing on financial instability (see Schinasi (2006) pps. 91-93).

All three of these aspects of the definition can and do entail both endogenous and exogenous elements. For example, surprises that can impinge on financial stability can emanate both from within and from outside the financial system. Moreover, the inter-temporal and forward-looking aspects of this particular way of defining financial stability serve to emphasize that threats to financial stability arise not only from shocks or surprises but also from the possibility of disorderly adjustments of imbalances that have built endogenously over a period of time – because, for example, expectations of future returns were mis-perceived and therefore mis-priced.[8]

There are several important implications of defining financial stability in this way.

First, judgments about the performance of the financial system entail how well the financial system is facilitating economic resource allocation, the savings and investment process, and ultimately economic growth. There are two-way linkages; the real economy can be positively or negatively affected by the financial system, and the performance of the financial system can be affected by the performance of the real economy. A framework useful for assessing financial stability must pay attention to these linkages.

Disturbances in financial markets or at individual financial institutions need not be considered threats to financial stability if they are not expected to damage economic activity at large. In fact, the incidental closing of a (minor) financial institution, a rise in asset-price volatility, and sharp and even turbulent corrections in financial markets may be the result of competitive forces, the efficient incorporation of new information, and the economic system's self-correcting and self-disciplining mechanisms. By implication, in the absence of contagion and the high likelihood of systemic effects, such developments may be viewed as welcome – if not healthy – from a financial stability perspective. Just as in Schumpeterian business cycles, where the adoption of new technologies and recessions have both constructive and destructive implications, a certain amount of instability can be tolerated from time to time because it may encourage long-term financial system efficiency. [9]

Second, financial stability is a broad concept, encompassing the different aspects of the financial system – infrastructure, institutions, and markets. Because of the interlinkages between these components, expectations of disturbances in any one component can affect overall stability, requiring a systemic perspective. Consistent with the definition of the financial system, at any given time, stability or instability could be the result of either private

[8] That financial stability should not be thought of simply as a static concept of shock absorption capacity has been emphasized, among others, by Minsky (1982) and by Kindleberger (1996).

[9] See Schumpeter (1934).

institutions and actions, or official institutions and actions, or both simultaneously and/or iteratively.

Third, financial stability not only implies that the financial system adequately fulfills its role in allocating resources, transforming and managing risks, mobilizing savings, and facilitating wealth accumulation and growth, but also that within this system the flow of payments throughout the economy functions smoothly (across official and private, retail and wholesale, and formal and informal payments mechanisms). This requires that money – both central bank money and its close-substitute, derivative monies (such as demand deposits and other bank accounts) – adequately fulfills its role as means of payment and unit of account and, when appropriate, as a (short-term) store of value. In other words, financial stability and what is usually regarded as a vital part of monetary stability overlap to a large extent. [10]

Fourth, financial stability requires the absence of financial crises and the ability of the financial system to limit and deal with the emergence of imbalances before they constitute a threat to stability. In a well-functioning and stable financial system, this occurs in part through self-corrective, market-disciplining mechanisms that create resilience and that endogenously prevent problems from festering and growing into system-wide risks. In this respect, there may be a policy choice between allowing market mechanisms to work to resolve potential difficulties and intervening quickly and effectively – through liquidity injections via markets, for example – to restore risk-taking and/or to restore stability. Thus, financial stability entails both preventive and remedial dimensions.

Last, but not least important, financial stability can be thought of as occurring along a continuum – reflecting different possible combinations of conditions of the financial system's constituent parts. An analogy is the health of an organism, which also occurs along a continuum. A healthy organism can usually reach for a greater level of health and well being, and the range of what is normal is broad and multi-dimensional. In addition, not all states of un-health (or illness) are significant, systemic, or life threatening and some illnesses, even temporarily serious ones, allow the organism to continue to function reasonably productively and return to a state of health without permanent damage. One implication of seeing financial stability in this way is that maintaining financial stability does not necessarily require that each part of the financial system operates persistently at peak performance; it is consistent with the financial system operating on a 'spare tire' from time to time.[11]

[10] See Padoa-Schioppa (2003) and Schinasi (2003) on the role of central banks in financial stability.

[11] See Greenspan (1999).

The concept of a continuum is relevant because finance fundamentally involves uncertainty, is dynamic (meaning both inter-temporal and innovative), and is composed of many interlinked and evolutionary elements (infrastructure, institutions, markets). Accordingly, financial stability is expectations-based, dynamic, and dependent on many parts of the system working reasonably well. What might represent stability at one point in time might be more stable or less stable at some other time, depending on other aspects of the economic system – such as technological, political, and social developments. Moreover, financial stability can be seen as being consistent with various combinations of the conditions of its constituent parts, such as the soundness of financial institutions, financial markets conditions, and effectiveness of the various components of the financial infrastructure.

What is systemic financial risk?

According to the G-10 Report on financial consolidation and risk,

> "Systemic financial risk is the risk that an event will trigger a loss of economic value or confidence in, and attendant increases in uncertainly about, a substantial portion of the financial system that is serious enough to quite probably have significant adverse effects on the real economy. Systemic risk events can be sudden and unexpected, or the likelihood of their occurrence can build up through time in the absence of appropriate policy responses. The adverse real economic effects from systemic problems are generally seen as arising from disruptions to the payment system, to credit flows, and from the destruction of asset values."[12]

The G-10 study notes that this definition encompasses much of what is in the literature but it is stricter in two respects. One is that the negative externalities of a systemic event extend into the real economy. They are not confined to the financial system. The second is that this extension into the real economy occurs with relatively high probability. The emphasis on real effects reflects the view that it is the output of real goods and services and the accompanying employment implications that are the primary concern of economic policymakers. "In this definition, a financial disruption that does not have a high probability of causing a significant disruption of real economic activity is not a systemic risk event."

Taken together, a good understanding of what is meant by financial stability and what is meant by financial instability can serve to define boundaries around the scope of the analysis. The safeguarding of financial stability should not be understood as a zero tolerance

[12] Group of Ten (2001).

of bank failures or of an avoidance of market volatility but it should avoid financial disruptions that lead to real economic costs. [13]

Framework for Assessing Financial Stability

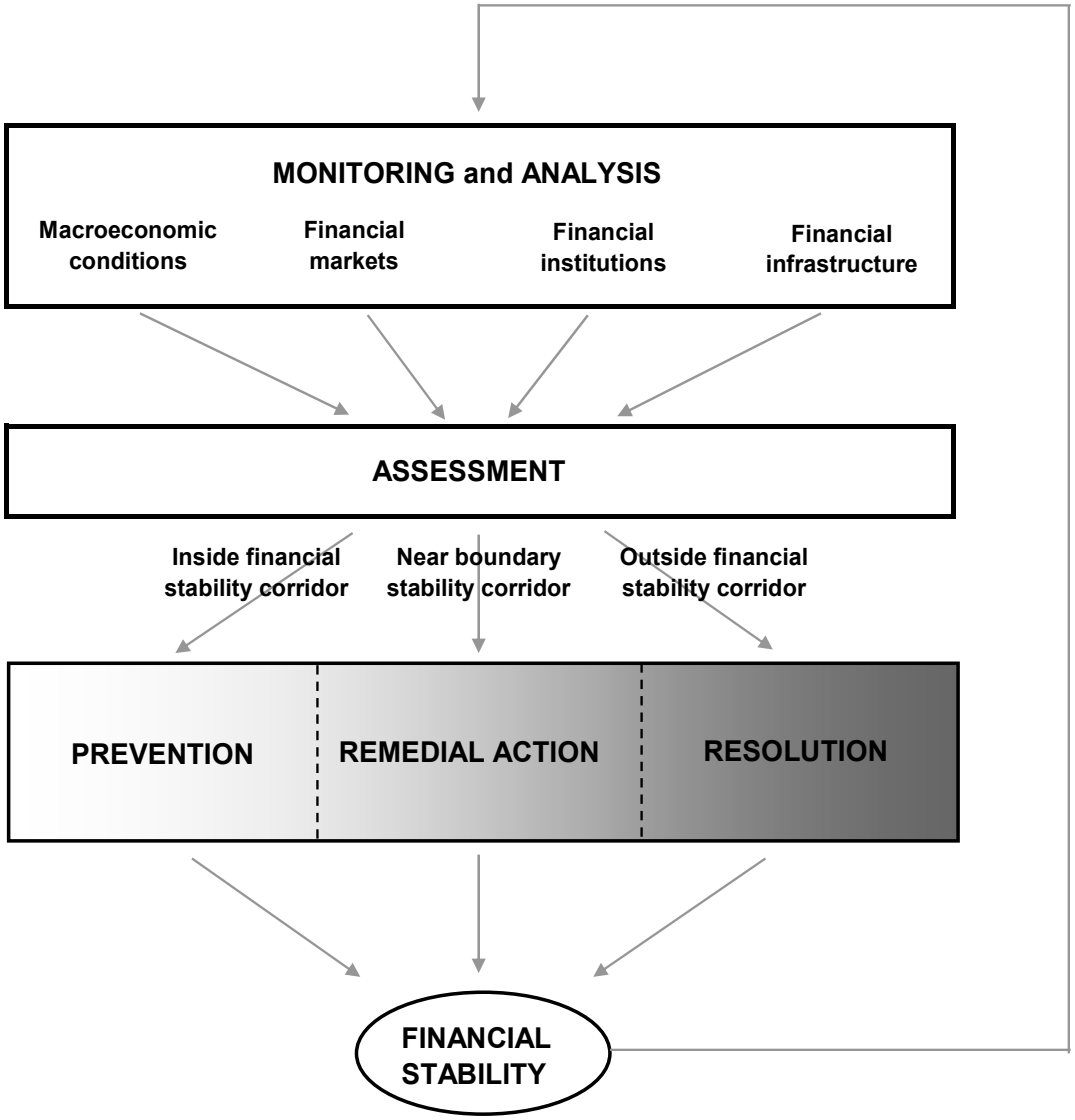
With working definitions of the financial system, financial stability, and systemic risk in hand, it is now possible to discuss the key role of financial stability assessments in safeguarding financial stability. A key to safeguarding financial stability is the early identification of risks to stability and of potential sources of vulnerability in the financial system before they lead to unsustainable and potentially damaging imbalances and consequences. For example, weaknesses and vulnerabilities could exist in any of the components of the financial system – institutions, markets, infrastructure – and could entail all three simultaneously. Along with identifying potential sources of risks and vulnerabilities, it is also desirable to attempt to calibrate their intensity and potential for (or probability of) leading to financial-system problems and possible systemic effects. Financial stability assessments are a key part of prevention.

A schematic that might be considered as representing a reasonable framework for assessing financial stability is presented in Figure 4. Both prevention and resolution of financial imbalances are part of the framework.

In order to prevent financial imbalances from occurring or becoming significant enough to pose a risk to financial stability, it would be desirable if the approach taken were to entail a continuous process of information gathering, technical analysis, monitoring, and assessment. Because of the linkages between the real economy and the financial system, and also the various components of the financial system, this continuous process would be most useful if it encompassed both economic and financial dimensions, and institutional knowledge about institutions, markets, and the financial infrastructure. In effect, the process needs to be comprehensive and analytical (see the top bar in Figure 4). Note that ongoing and more fundamental research into the changing structure of the financial system and its changing linkages to the real economy, as well as the further development of measurement techniques for detecting growing imbalances and calibrating risks and vulnerabilities, are vital for keeping up to date this important monitoring phase.

[13] Papers that focus on aspects of systemic risk are: De Bandt and Hartmann (2000), Hoelscher and Quintyn (2003), and Summer (2003).

Figure 4. Framework for Maintaining Financial System Stability



Source: Schinasi (2006) and Houben, Kakes, and Schinasi (2004).

The process entails information gathering about, and monitoring of, the macro-economy (and at times microeconomic aspects as well) and the various aspects of the financial system through supervisory, regulatory, and surveillance mechanisms. Each of the financial-system monitoring components could entail both macro- and micro-prudential characteristics. For example, when it comes to gathering information about and monitoring individual institutions, the supervisory process could be aided by knowledge about where the economy is along the business and credit cycles and how markets have been performing overall: the reason being that the macro-economy and markets provide the background

against which the operational performance of individual institutions should be assessed. Likewise an assessment of the condition of financial markets could be different depending on whether the major institutions operating in the markets were well capitalized and profitable or not. This is another way of observing that there are tradeoffs, even in the assessment process in safeguarding financial stability.

The reason for gathering information, analyzing it, and continuously monitoring the various components of, and influences on, the financial system is systematically and periodically to make assessments of whether the financial system is more or less performing its main functions well enough to be judged to be within a corridor of financial stability along the continuum discussed earlier. Such an assessment could lead to three conclusions each of them having quite different implications for action (see the middle bar in Figure 4 labeled assessment and the arrows). The financial system can be judged to be in a zone or corridor of financial stability, as approaching a boundary of stability/instability, or outside a zone or corridor of stability. Within the third category, the financial system could be further judged to be in a position in which self-corrective processes and mechanisms are judged to be likely to move the system back toward the corridor of stability or alternatively to need prompt remedial and even emergency measures to reverse the instability. [14]

One could also develop a delineation of financial conditions and potential difficulties according to their intensity, scope, and potential threat to systemic stability. For example, potential financial difficulties can be thought of as falling into one of the following fairly broad categories:

- difficulties in a single institution or market not likely to have system-wide consequences for either the banking or financial system;

- difficulties that involve several relatively important institutions involved in market activities with some nontrivial probability of spillovers and contagion to other institutions and markets; and

- problems likely to spread to a significant number and types of financial institutions and across usually unrelated markets for managing liquidity needs, such as forward, interbank, and even equity markets.

Problems occurring within each of these categories would require different diagnostic tools and policy responses, ranging from doing nothing to intensifying supervision or surveillance of a specific institution or market, to liquidity injections into the markets to dissipate strains, to interventions into particular institutions.

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[14] As Kindleberger (1996) puts it: "....markets work well, on the whole, and can normally be relied upon to decide the allocation of resources and, within limits, the distribution of income, but that occasionally markets will be overwhelmed and need help".

Practical Challenges in Implementing an Assessment Framework

While categories of possible assessments may be easy to discuss in principle, they are difficult to identify in actual practice. How should the boundary of stability be defined and measured, for example? When does an isolated small problem threaten to become a systemic one? There would also seem to be a bias to be prudent and overreach in identifying both potential sources of risks and vulnerability and overestimate their likelihood and importance. Thus, it would be useful to establish some ground rules or guidelines for disciplining the continuous process of information gathering, analysis, and monitoring, and most importantly for identifying sources of risks and vulnerabilities. A check list of disciplining principles for identifying risks and vulnerabilities and for assessing where along the stability spectrum the financial system might be could include the following:[15]

- Is the process systematic?
- Are the risks identified plausible?
- Are the risks identified systemically relevant?
- Can linkages and transmission (or contagion) channels be identified?
- Have risks and linkages been cross-checked?
- Has the identification of risks and the assessment been time consistent?

In practice, the process of assessing financial stability entails a *systematic* identification and analysis of the sources of risk and vulnerability that could impinge on stability in the circumstances in which the assessment is being made. For example, consider the comprehensive list of sources of risks in Table 8. An operationally significant distinction is made between endogenous sources of risk that are present within the financial system and exogenous sources of risk that might emanate from outside the realm of finance.

[15] These ideas and concepts are developed in detail in Fell and Schinasi (2005).

Table 8. Sources of Risk to Financial Stability

Endogenous	**Exogenous**

Institutions-based:
• Financial risks
  ○ Credit
  ○ Market
  ○ Liquidity
  ○ Interest rate
  ○ Currency
• Operational risk
• Information technology weaknesses
• Legal/integrity risk
• Reputation risk
• Business strategy risk
• Concentration risk
• Capital adequacy risk
 	
Market-based:
• Counterparty risk
• Asset price misalignment
• Run on markets
  ○ Credit
  ○ Liquidity
• Contagion
 	
Infrastructure-based :
• Clearance, payment and settlement system risk
• Infrastructure fragilities
  ○ Legal
  ○ Regulatory
  ○ Accounting
  ○ Supervisory
• Collapse of confidence leading to runs
• Domino effects
	Macroeconomic disturbances:
	• Economic-environment risk
	• Policy imbalances
	Event risk
	• Natural disaster
	• Political events
	• Large business failures

Source: Schinasi (2006) and Houben, Kakes, and Schinasi (2004).

In keeping with the broad definition of the financial system outlined above, endogenous sources of risk can arise either in financial institutions, or in financial markets, or in the infrastructures, or in any combination. For instance, credit, market or liquidity risks may be present in financial institutions which, if they materialize, could hamper the process of reallocating financial resources between savers and investors. Financial markets can be a source of endogenous risk not only because they offer alternative sources of finance to non-financial sectors but also because they entail systemic linkages between financial institutions, and more directly between savers and investors. Financial infrastructures are also an important endogenous source of risk, in part because they entail linkages between market participants as well, but also because they provide the institutional framework in which financial institutions and markets operate.

Outside the financial system, the macroeconomic environment can be an exogenous source of risk for financial stability because it directly influences the ability of economic and financial actors (households, companies, and even the government) to honor their financial obligations. Financial stability assessments should entail a systematic and periodic process of monitoring of each of these sources of risks, both individually and collectively by taking account of cross-sector and also cross-border linkages. This process should satisfy at least the list above.

There are also formidable measurement and modeling challenges in the ability to assess the strength and robustness, or to calibrate the plausibility and importance of the various risks, or to appraise quantitatively the potential costs should risks materialize. In actual practice many shortcuts and qualitative judgments must be made in order to produce an overall assessment.

For most macroeconomic or monetary policy objectives (unemployment, external or budgetary equilibrium, price inflation, etc.) there is a widely-accepted measurable (set of) indicator(s) that define, and measure deviations from, the objective, even if still subject to methodological and analytical debate and even controversy. In the case of both macroeconomics and monetary economics it took each of them some twenty-to-thirty years of practice, trial, and error, measurement and modeling development, and fundamental research to accomplish this. As noted in the introduction, financial stability analysis is still in an infant stage of development. Thus, by contrast, there is as yet no widely-accepted set of measurable indicators of financial stability that can be monitored and assessed over time. In part, this reflects the multifaceted nature of financial stability, as it relates to both the stability and resilience of financial institutions, and to the smooth functioning of financial markets and settlement systems over time.[16] Moreover, these diverse factors need to be weighed in terms of their potential ultimate influence on real economic activity. But it also reflects the relatively young age of the discipline of assessing financial stability. Because measurement is not highly developed yet, it is reasonable to see the current practice of making financial stability assessments more as an art form than as a rigorous discipline or science.

Challenges in measuring financial system stability reach well beyond the challenges of measuring the degree of stability in each individual sub-component of the financial system. Financial stability requires that the constituent components of the system – financial institutions, markets, and infrastructures – are jointly stable. Weaknesses and vulnerabilities in one component may or may not compromise the stability of the system as a whole,

[16] Sets of indicators have been developed, and are widely used, for assessing the soundness of banking institutions. See for example the IMF Soundness Indicators, both core and encouraged sets in IMF (2003), and the IMF's guide on financial soundness indicators (accessible for the IMF website), IMF (2004).

depending on size and linkages – including the degree and effectiveness of risk-sharing between different components. Moreover, as different parts of the system perform different tasks, there are challenges to aggregating information across the system. For example, in diversified financial systems - where both financial institutions and markets are important providers of finance - there is no commonly accepted way of aggregating information on the degree of stability in both the banking system and financial markets to form an overall assessment of system stability. If the banking system is functioning well but, at the same time, there are signs of strains in financial markets, the overall assessment of financial system stability is likely to be ex ante ambiguous, particularly if the respective shares of the two components as providers of finance are similar. The more complex and sophisticated is a financial system, the more complex is the task likely to be of measuring overall stability in a precise way.

Financial stability assessments carry a higher degree of uncertainty than ordinarily associated with forecasts based on macro-econometric models. This is because there are formidable practical challenges to measuring, modeling, and assessing the consequences of rare events.

- First, if past crises were prevented or tackled by policy actions, assessments of the likely costs of a selected scenario, based on simulations drawn from historical data-sets, will likely prove to be biased unless sufficient account is taken of policy reaction functions. It is doubtful that past policy responses to episodes of financial stress could be summarized by a mechanical reaction function, particularly if the authorities were mindful of avoiding the moral hazards that typically follow from predictable behavior. Moreover, even in cases that did not lead to policy responses, the frequency of crises in historical data sets may be too low to facilitate precision in estimating the likely 'policy neutral' consequences of a stylized scenario.

- Second, confidence intervals around the expected output losses associated with the materialization of a specified scenario may be neither well defined statistically, nor defined at all. For instance, simulations based on historical episodes tend to be founded on statistical relationships that reflect the central tendency of probability distributions, rather than the tails. Moreover, for hypothetical scenarios, which have not occurred in the past, it may not be possible to compute a confidence interval around the simulation because the events themselves may be subject to Knightian uncertainty – or unquantifiable risk.[17]

- Third, most macro-econometric models used for stress-testing tend to be built on the basis of log-linear relationships. For simulations, this means that a doubling of the size of a shock will result in a proportionate change in the effect. However, in reality, it can

[17] See Knight (1921)

never be excluded that in situations of financial stress, unpredictable non-linearities may surface, for instance due to threshold effects.

- Fourth, as witnessed during the near collapse of Long Term Capital Management in 1998, unexpected linkages may surface during crises – such as correlations between financial markets that ordinarily tend to be uncorrelated. Given such uncertainties, the real economic costs associated with a particular scenario could well prove to be larger than those predicted by an empirical model. Such considerations would suggest that the output of any stress-testing exercise should only be viewed as indicative of how, or if, the financial system would endure adverse disturbances. In order to avoid complacency, this calls for a high degree of caution and judgment in forming financial assessments.

In order to advance the practice of financial stability assessment from what is essentially an art towards a science, progress is necessary on at least three fronts: data, models, and understanding of linkages. A priority for data gathering must be micro balance sheet data covering financial institutions, households, and firms. While a picture of the aggregate risks borne within each of these sectors can be useful for financial stability analysis, far more important is an understanding of the way in which the risks are distributed across sectors and especially whether or not concentrations or pockets of vulnerabilities can be pinpointed. In mature economies, the availability and comprehensiveness of such data is rather mixed, particularly for the household sector.

Two areas where more and better analytical research on financial stability modeling appears necessary include models for identifying risks and vulnerabilities and models for assessing the consequences of adverse disturbances.[18] Concerning the identification of risks, the literature suggests that it is doubtful that models will ever be capable of predicting crises, particularly precise timing. Nevertheless, this should not stand in the way of developing models for assessing vulnerabilities. Even simple single indicator approaches can be useful for gauging risks to financial stability (see Campbell and Shiller (2001)) and current work holds promise for the development of more comprehensive frameworks for pinpointing the sets of variables (see IMF (2004)) and the conditions that raise the likelihood of financial stress (for example, see Aspachs, Goodhart, Segoviano, Tsomocos, and Zicchino (2006)). As for the prediction of crises, it cannot be excluded that drawing on the intellectual advances made in other disciplines in the modeling of complex and discontinuous processes – such as the prediction of earthquakes – may offer insights for financial stability assessment.

[18] See Sahajwala and Van den Berg (2000) for an overview of early warning systems used by some G-10 authorities, and Persson and Blåvarg (2003) on the use of financial market indicators.

Concluding observations

[To be completed after conference]

[[[The ongoing crisis reveals that the framework in place prior to the summer 2007 was inadequate for safeguarding financial stability against a systemic threat emanating from both the real and financial economies around the globe. All lines of defense against imbalances growing to systemic proportions failed to work as intended or hoped, both private and official lines of defense.

More . . . .

Once stability is restored, an important fundamental remaining challenge is for the international community to agree on a framework for safeguarding financial stability once it is achieved. First and foremost this requires a deeper understanding of what financial stability requires and how dependent economic stability is on the presumption of financial stability. This we do not yet fully understand.

Obviously, it would help to have a consensus of what is meant by financial stability and an agreed framework for safeguarding it. This framework must entail both prevention of imbalances from becoming systemic and resolution mechanisms for limiting the damage of systemic problems if they surface. Both aspects of the existing frameworks around the world have proven to be inadequate for containing systemic risk in the modern global financial system.

An important component of any framework will be analytical frameworks for both understanding the conceptual and policy challenges and also for practically monitoring and assessing financial stability and the ability of the financial system to eliminate imbalances as they arise through market-based mechanisms – that is, more effective 'ex ante' market discipline. If the ability to dissipate imbalances is found wanting, then the system could be seen as either in or about to experience a state of instability for which remedial actions would be required.

The purpose of this paper was to propose some steps forward in the direction of a framework for safeguarding financial stability based on a definition of financial stability. The definition proposed explicitly links the concept of financial stability to that of economic efficiency. If practical terms, such a definition can be the basis for a practical analytical framework that explicitly links the performance of the financial system to that of the performance of the economic system. If this can be done, this would be an important advance, because one of the main weaknesses of current practice is that we do not yet know enough about the linkages between the real and financial economies. This should not be a mysterious gap in our knowledge once it is recognized that the economics profession still has

not been able to integrate the analysis of macroeconomic tendencies with financial-system tendencies. The current crisis reveals that this is indeed a major weakness of our existing analytical tools in financial-stability analysis.

My hope is that some of the ideas put forward in this paper will help others think through some of the important remaining challenges.]]]

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