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Does Regulatory Governance Matter for Financial System Stability? An Empirical Analysis

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Monetary and Financial Systems Department

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Abstract

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This paper provides empirical evidence that the quality of regulatory governance—governance practices adopted by financial system regulators and supervisors—matters for financial system soundness. The paper constructs indices of financial system soundness and regulatory governance, based on country data collected from the Financial Sector Assessment Program (FSAP). Regression results indicate that regulatory governance has a significant influence on financial system soundness, along with variables reflecting macroeconomic conditions, the structure of the banking system, and the quality of political institutions and public sector governance. The results also indicate that good public sector governance amplifies the impact of regulatory governance on financial system soundness.

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*“What Government is the best?
That which teaches us to govern ourselves.”*

Johann Wolfgang von Goethe

I. INTRODUCTION

Policy discussions and research pertaining to financial stability and its key building blocks are increasingly recognizing the importance of good governance, in general, and on the part of financial system oversight agencies (regulatory governance), in particular. Growing emphasis is being placed on financial system standards and codes, developed by international standard-setting bodies, on elements of good governance for sectoral regulators and supervisors.² This greater attention, however, has so far come about on an ad hoc basis, bereft of much analytical foundation.

A first systematic approach toward the role and importance of regulatory governance for financial stability was undertaken by Das and Quintyn (2002). That paper (i) provided an operational framework on regulatory governance; (ii) established the “governance nexus” to underline the importance of financial system governance for the proper functioning of the nonfinancial sector; and (iii) assessed the current practices with regard to the quality of regulatory governance, based on the work undertaken by the IMF and World Bank since 1999 in the context of the Financial Sector Assessment Program (FSAP).

This paper follows up on the earlier work and empirically explores the relationship between regulatory governance and financial system stability. In doing so, this makes a threefold contribution. First, it constructs an index for financial system soundness (used as a proxy for financial system stability); second, it builds an index for the quality of regulatory governance; and third, it quantifies the impact of the quality of regulatory governance on financial system soundness. The paper also identifies areas of further research relating to the governance-financial stability interrelationship. Given the wider availability and comparability of cross-country banking system data, this paper quantifies the impact of good regulatory governance on banking system soundness only.

² Reference is to regulatory and supervisory standards developed by the Basel Committee for Banking Supervision (BCBS), the International Association of Insurance Supervisors (IAIS), the International Organization of Securities Commissions (IOSCO), the Basel-based Committee on Payment and Settlement Systems (CPSS), and the IMF. The revised IAIS core principles for insurance supervision, adopted in October 2003, explicitly place emphasis on regulatory governance issues.

A multivariate cross-sectional analysis shows that the quality of regulatory governance indeed matters for the soundness of the banking system. The model is tested, using a range of control variables pertaining to the macroeconomic environment, the structure of the financial system, and the political and institutional setting. The latter has a direct and indirect impact on financial system soundness, with the indirect links showing that the effects of good regulatory governance are amplified when supported by good governance practices in the public sector as a whole.

The ultimate goal is to broaden the concepts introduced in this paper to the entire financial system. Data limitations prevent us from doing so at this time. However, when including one important nonbank financial system component—the insurance sector—preliminary tests reveal that good regulatory governance practices are not as prevalent as in the banking sector alone. With more evidence of financial insolvencies and failures emerging, the systemic importance of the nonbank sectors is growing. Such findings highlight the need for stronger regulatory governance practices in the nonbank financial sectors to support financial soundness in general and to limit the possibility that systemic problems emanating from these sectors spill over to the rest of the financial system.

Even though this research is work in progress, the results carry significant implications for financial stability-related policy making. The findings show that institutional enhancements at all levels of the regulatory and supervisory machinery are vital for maintaining financial system soundness. They also indicate that the adoption of international practices and standards is important in the pursuit of financial system stability.

The paper is structured as follows. Section II discusses the concepts of financial stability and financial system soundness (FSSI) and constructs an index of FSSI. Section III lays out the linkages between regulatory governance and FSSI and constructs an index of regulatory governance (RGI). Section IV presents the model and the empirical results. Section V discusses preliminary findings on the quality of regulatory governance in the broader financial system. Conclusions and a further research agenda are presented in Section VI. Methodologies, data sources, and some additional results are presented in the appendices.

II. FINANCIAL STABILITY AND ITS MEASUREMENT

A. Operational Definition

The term financial stability has gained prominence in international policy discussions and has become an actively discussed academic topic since the mid-1990s. However, a precise definition still eludes the work done so far. As Issing (2003) and Padoa-Schioppa (2003) note, several authors find it easier to define financial instability, instead of its positive counterpart.

Following Issing, two types of positive definitions are emerging from the literature. First, those taking a systemic view and emphasizing the resilience of the financial system as a key component of stability. In this view, an individual bank failure is not necessarily proof of

financial instability. Such an event can even contribute to more efficient financial intermediation, and thus help maintain or enhance stability. Following Mishkin (1991 and 1997), one can say that financial stability stems from the prevalence of a financial system that is able to provide on a durable basis, and without major disruptions, an efficient allocation of savings to investment opportunities (see also Padoa Schioppa, (2003) and Haldane and others (2001) for similar approaches).

The second approach to defining financial stability is to liken it to situations **without** banking crises and **with** asset price stability. The advantage of this approach is that more directly observable variables can be used (for instance, interest rate smoothness), but on the whole it is conceptually less appealing because the “absence of banking crises” still offers no insights in the relative strength of the financial system.

The definition offered by Crockett (1997) bridges, in many ways, those two strands. As Crockett states (Crockett, 1997, p. 6), “stability requires (i) that the key institutions in the financial system are stable, in that there is a high degree of confidence that they can continue to meet their contractual obligations without interruption or outside assistance; and (ii) that the key markets are stable, in that participants can confidently transact in them at prices that reflect fundamental forces and that do not vary substantially over short periods when there have been no changes in fundamentals.” However, he acknowledges the operational limitations of such a broad definition: one needs to decide which are the “key institutions” whose stability is important, and what degree of price stability in financial markets is required.

This paper adopts the positive and systemic approach by emphasizing the resilience of the financial system to shocks—the capacity to “withstand events.” Consistent with this approach and for the purposes of this paper, we refer to **financial system soundness** instead of using the broader and less definable concept of financial stability. The term “soundness” better reflects the resilience element, is measurable, and constitutes a major component of the overall concept of financial stability.³

³ Admittedly, from the viewpoint of **global** financial stability, having sound national financial systems is a necessary, but not sufficient condition. If the global financial market infrastructure is not robust, the spillover of crises can be magnified. In addition to stable national financial systems, global stability also depends on (i) effective management of the counterparty risk by global financial institutions; (ii) supervisors responsible for the efficiency of the global financial infrastructure; (iii) robustness of payment systems in the major financial centers; and (iv) sustainable macroeconomic policies backed by adequate foreign exchange reserves, and a credible exchange rate regime.

B. Financial System Soundness and the Role of Supervisors

A slightly narrower focus on financial system soundness, as opposed to financial stability also serves another purpose. Since this paper estimates the impact of regulatory governance, the concept should be so defined that regulators and supervisors can be held responsible for its achievement. Supervisors alone cannot be held responsible for the country's financial stability in its broadest meaning. Achieving this goal depends also on elements and actions **outside the direct control** of the supervisor. These elements include macroeconomic policies, monetary stability, and the presence and quality of a financial sector safety net. Other institutions—notably the central bank in its monetary policy role—have an important responsibility in contributing to financial stability, by pursuing monetary stability. A growing body of literature is exploring the linkages between monetary and financial stability, and the changing role of the central bank.⁴ Many central banks are seeking—or have already obtained—a formal mandate to pursue financial stability, in addition to their monetary stability mandate (typically price stability). This trend is reflective of the complementarity between the pursuit of monetary and financial stability.

The central banks' task in pursuing financial stability is complemented by the work of the supervisory agencies. The latter's task is mainly defined as maintaining the prudential and financial soundness of the firms under their supervision.⁵ To achieve full complementarity, however, supervisors should be urged to focus not only on the health of individual institutions—their traditional mandate—but monitors the system wide implications as well.

Recent academic and policy work provides tools to achieve greater synergy between central banks and supervisors. Borio (2003) advocates the development of a macroprudential framework for financial supervision. The author makes a distinction between a macroprudential approach to supervision (limiting the risks involved in episodes of financial distress with significant output losses for the economy as a whole), and a microprudential approach (the traditional approach, focusing on risks in individual banks with a eye on depositor and investor protection) and argues that supervisors should incorporate elements of the macro-prudential approach in their work.⁶

⁴ See, for instance, Schwartz (1986), Breal and others (2001), Bank of International Settlements (2000), Ferguson (2002), Issing (2003), Padoa Schioppa (2002 and 2003), and Schinasi (2003), as well as the literature cited in these contributions.

⁵ See McDonough (2002) for similar views.

⁶ Elaborating on this view, Borio and White (2003) argue that the emerging financial environment calls for greater cooperation between monetary and prudential authorities. They put forward the notion of “elasticity of an economic system,” i.e., a system's inherent potential to allow financial imbalances to build up over time, with endogenous forces failing to rein them in, until the imbalances unwind, possibly resulting in financial instability.

To underpin such a macroprudential approach, Evans and others (2000) and Sundararajan and others (2002) develop in the context of the FSAP work and the IMF's surveillance mandate, a set of financial soundness indicators, which national authorities are encouraged to adopt in their off-site analysis of the financial sector (IMF, 2003). Aggregation of individual bank data provides a first glance at the soundness of the system.

This broader role for financial system supervisors in promoting systemic stability has been explicitly recognized in recently revised charters of some agencies, often as part of a reorganization of the sectoral supervisory responsibilities. The supervisory agencies, for instance in Chile, Germany, Japan, Switzerland, and the United Kingdom have an explicit mandate to pursue stability of the sector.⁷ In many other countries, however, prudential oversight of the individual institutions is still the core of the supervisory mandate.⁸

C. Index of Financial System Soundness

To capture the notion of resilience and soundness, we construct a FSSI. The use of an index is appealing in that it allows to gauge the degree of (un)soundness of a given system, and provides an ex ante measure of soundness.⁹ In addition, when analyzing the impact of the quality of regulatory governance, an approach based on degrees of (un)soundness seems capable of providing more insights than a stability/crisis approach.

The use of a continuous index differs from most other work undertaken recently.¹⁰ Several authors approach financial stability from the viewpoint of extreme financial instability (a financial crisis).¹¹ Typically, these studies use a 1/0 dummy to reflect the occurrence of a banking crisis. While the appeal of such an approach is that it yields a directly observable variable, it fails in distinguishing among degrees of (in)stability (or (un)soundness) that this paper is interested in, and misses out on periods of financial distress that did not result in a full-blown crisis.

⁷ See Hüpkes, Quintyn, and Taylor (2004).

⁸ In practice, many more supervisory authorities are already taking elements of a macroprudential framework into account in their analysis.

⁹ In this sense, the approach is also consistent with the work undertaken under the FSAP, which is focused on crisis prevention.

¹⁰ Admittedly, the purpose of some of the studies reviewed here may differ from this one, justifying different approaches. Nonetheless, the index approach can certainly be used for many purposes.

¹¹ This is for instance the case in seminal work by Demirgüç-Kunt and Detragiache (1998), Barth, Caprio, and Levine (2000), Rossi (1999), Barth, Caudell, Hall, and Yago (2000), and Goldstein and others (2000).

Another strand in the literature uses single variables as proxies for financial stability—or for the performance of the financial system. Barth, Caprio, and Levine (2001) use several measures of bank performance as the dependent variable to assess the impact of regulatory and supervisory quality (these studies are mainly interested in the impact on bank development and fragility).¹² Sundararajan, Marston, and Basu (2001) use nonperforming loans (NPLs) as the dependent variable to estimate the impact of compliance with the Basel Core Principles (BCP) on financial stability.

A different approach is adopted in Kent and Debelle (1999). Starting from the premise that policymakers observe a monotonic relationship between the size of financial disturbances and the resulting macroeconomic losses, they define and measure system stability (or instability) in terms of expected macroeconomic losses arising from financial system disturbances. They construct an index of stability, reflecting the probability of various financial disturbances and the size of the macroeconomic costs arising from such disturbances.¹³

The index approach is used by Corsetti, Pesenti, and Roubini (1999) for the Asian crisis. They construct an index of financial fragility based on NPLs data and on information on the presence of a lending boom. An index approach has also been implicitly suggested in Johnston and others (2000) and has been adopted in some private sector work.¹⁴ The best-known private sector index of financial system strength is Moody's Bank Financial Strength Ratings. Moody's define their index as follows: "Factors considered in the assignment of Bank Financial Strength Ratings include bank-specific elements such as financial fundamentals, franchise value, and business and asset diversification. Although Bank Financial Strength Ratings exclude the external factors specified above, they do take into account other risk factors in the bank's operating environment, including the strength and prospective performance of the economy, as well as the structure and relative fragility of the financial system, and the quality of banking regulation and supervision."

The FSSI constructed in this paper is limited to the banking system mainly because comparable data on the banking system and on its supervision is available for a larger set of countries than data on other subsectors. Limiting the analysis to the banking system is not a major drawback from an analytical point of view since banking sector soundness has a predominant impact on the financial system.

¹² Barth, Caprio, and Levine (2001) used bank development, net interest margin, overhead costs, NPLs, and crisis (0/1); in Barth, Nolle, and others (2002), bank profitability is the dependent variable.

¹³ See also Haldane (2001).

¹⁴ Johnston and others (2000) suggest to measure financial stability by aggregate (continuous) variables of financial sector instability and vulnerability.

The FSSI is composed of two quantitative variables¹⁵ the capital adequacy ratio (CAR) and the ratio of NPLs. The CAR is the ultimate indicator of the resilience of a financial institution to shocks to its balance sheet, while the ratio of NPLs signals the quality of the financial institutions' portfolio and, in the end, their solvency (Evans and others 2000).¹⁶

An index composed of these two variables provides a reliable basis to measure financial sector soundness in individual countries over time.¹⁷ However, for any meaningful cross-country comparison, it is important to weigh the index so as to arrive at a measure of the relative strength of the systems in the sample. For our analysis, we weigh the index with the share of bank credit in GDP.¹⁸ In systems where credit markets are small and less developed, the cost of financial instability—measured as the fiscal cost of a bail-out or the resulting macro-economic losses—will be lower than in systems with developed credit markets.

Figure 1 shows the FSSI for three groups of countries.¹⁹ Perhaps not surprisingly, it suggests that financial system soundness is significantly higher in advanced countries in the sample, than in transition or developing countries.²⁰

¹⁵ See Appendix I for the technical details.

¹⁶ Ideally, the index should be broader, encompassing also data about the quality of the financial system. Intuitively, an aggregated CAMEL index (including measures of capital adequacy, asset quality, management soundness, earnings, liquidity, and sensitivity to market risk) as suggested by Sundararajan and other (2002) has a lot of appeal as a soundness indicator, since it combines quantitative and qualitative elements. Unfortunately, a consistent set of cross-country data is not yet available for all these indicators.

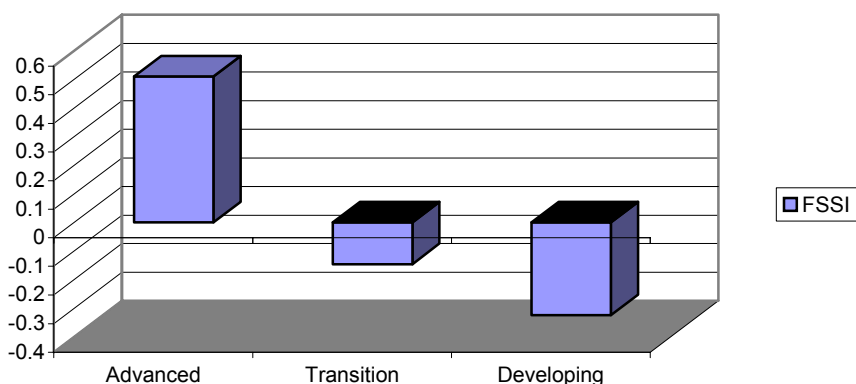
¹⁷ A drawback of these two variables is that they are considered backward looking. However, this does not invalidate their use. First, for the purposes of this paper—an international comparison—this criticism does not hold. Second, when time series would be constructed to gauge the financial soundness of an individual country, downward movements in the index would still have a significant signaling value.

¹⁸ For a similar approach, see Corsetti, Pesenti, and Roubini (1998 and 1999).

¹⁹ According to former (pre-2004) World Economic Outlook (WEO) classification. The group consists of 11 advanced economies, 17 transition economies, and 27 developing countries.

²⁰ Appendix II compares the FSSI with the Moody's index. Our findings are broadly consistent with those of the Moody's index. The detailed list of the variables in Moody's index and the aggregation method used are not publicly available.

Figure 1. Financial System Soundness Index for Country Groupings 1/



1/ Country groupings according to WEO classification.

III. REGULATORY GOVERNANCE AND ITS MEASUREMENT

A. Regulatory Governance and Financial Stability—The Governance Nexus

Borio (2003) notes that the life of supervisors has changed dramatically over the past 20 years to 30 years. When overseeing the “largely” repressed financial systems that emerged in the post-war period, the quality of regulatory governance was seldom an issue. Nowadays, what they undertake—or do not undertake—in their supervisory capacity, and how they intervene, makes often headline news. Therefore, the role of governance has assumed special importance for regulators and supervisors.

Two factors have been driving this shift—financial liberalization and advances in risk management. These developments have several implications for financial stability through a resulting rise in competitive pressures, a structural increase in liquidity and potential for leverage, a rise in the option value implicit in safety nets, and a heightened significance of common factors that could lead to the spread of cross-market and cross-sector financial distress.²¹

In this new environment, financial systems are only as strong as the governing practices of all stakeholders—market participants as well as their regulators and supervisors—the financial soundness of the institutions, and the efficiency of the market infrastructure. Promoting and practicing good governance is a shared responsibility of market participants and regulatory agencies. It enhances the system-wide capacity to act collectively in a manner that deters unsound market practices and the occurrence of moral hazard, and enhances the effectiveness of system-wide management of stress.

²¹ Crockett (2003).

By reinforcing the credibility and moral authority of the regulatory agencies (and central banks), good regulatory governance helps in promoting sound practices among market participants.²² Ill-defined or dysfunctional governance arrangements do not support the required credibility and will contribute to the spread of unsound practices in the institutions under regulatory oversight, potentially impairing the stability of the financial system as a whole.²³ Seen from this viewpoint, the pursuit of financial stability is a continuous and permanent process, rather than an engagement that is triggered only in the event of an institution-specific crisis, and concludes with a defined end.

However, the two main groups of stakeholders referred to above—supervisors and financial institutions—do not operate in a vacuum but are influenced by other (political and economic) institutions, and the quality of their governance. More particularly, the quality of **public sector governance**—governance practices in the broader public sector—will have an impact on regulatory governance and financial sector governance. The impact on the latter can be direct or indirect through the supervisory authorities.²⁴

This broader picture can be captured by the notion of a “**governance nexus**,” modeling the impact of governance practices at each layer on the practices and the outputs of the next layer (Box 1).

The existence of the “governance nexus” is consistent with the views of the New Institutional Economics School (see, among others, Williamson (2000) for a comprehensive overview) that institutions and their governance have a significant impact on economic development and stability. Empirical evidence, corroborating the view of the primacy of institutions is increasingly emerging. See, for instance, Rodrik and others (2002). Our paper applies this framework to the narrower, but nonetheless very important domain of financial stability.

²² A study of those central banks and regulatory agencies explicitly assigned the financial stability mandate shows that these agencies have begun placing emphasis on governance related issues, such as transparency and disclosure of information on risks; strengthening market discipline through provision of better information, and clarity on policy postures; and an analysis of some of the qualitative dimensions such as information sharing arrangements and supervisory cooperation.

²³ See Goodhart (2001).

²⁴ Although not analyzed in the context of the financial system, Damania and others (2003) show that in politically unstable regimes, the institutions necessary to monitor and enforce regulatory compliance are weak, and hence corruption is widespread and compliance low.

Box 1. The Governance Nexus

The governance nexus refers to the impact of governance practices at each layer—government, supervisors, financial institutions, corporate sector—on the practices of the next layer. From bottom to top we have three components and their responsibilities:

- Financial institutions bear the ultimate responsibility for establishing good governance practices in their institutions in order to gain and keep the confidence of their clients and the markets. As lenders to, and thus stakeholders in, the corporate sector they have a special interest in ensuring effective corporate governance by their clients (Caprio and Levine, 2002). However, they can only exert effective corporate governance on firms if their own practices are sound. Good bank governance helps stimulate the efficient allocation of resources in the economy and helps achieve financial system soundness.
- Regulatory agencies play a key role in promoting and overseeing implementation of sound practices in the financial intermediaries. To achieve that goal, regulatory agencies themselves need to establish and operate sound governance practices. The channel by which regulatory governance leads to good financial sector governance runs through agency credibility. Consistently applied good governance practices help build an agency's credibility. By failing to apply good governance principles, regulatory agencies lose the credibility and moral authority to promulgate good practices in the institutions under their oversight. This could create moral hazard problems and contribute to unsound practices in the markets
- Good regulatory governance, in turn, cannot be sustained without good public sector governance. Good public sector governance is one of the main preconditions for good regulatory governance (and through it, for financial system soundness) and includes the absence of corruption, a sound approach to competition policies, an effective legal and judicial system, and an arm's length approach to government ownership. As long as interference in the regulatory process—or directly in the financial system—is not costly for the politicians, regulatory governance cannot be effective.

B. Framework for Good Regulatory Governance

Like financial stability, good regulatory governance is considered desirable, but at the same time hard to define. Based on the broader definition of public sector governance offered by Kaufman and others (2000), good regulatory governance can be defined as (a) the capacity to manage resources efficiently and to formulate, implement, and enforce sound prudential policies and regulations—to be seen as the duty to meet the delegated objectives; and (b) the respect of the agency for the broader goals and policies of the (elected) legislature.²⁵

The unique nature of financial supervisors—in particular banking supervisors, but increasingly also supervisors of other subsectors of the financial system—has been widely recognized.²⁶ Supervision of the financial sector is more crucial than of most other sectors of

²⁵ See also Das and Quintyn (2002).

²⁶ Quintyn and Taylor (2003) and references therein.

the economy because of the public good-aspect of financial intermediation. Critical supervisory tools such as sanctioning and enforcement—including revoking licenses—to ensure the stability of the system can have a far-reaching impact on stakeholders' property rights. To prevent abuse of these powers, safeguarding the integrity of the supervisory function is a key objective which, therefore, should be based on high quality governance practices.

However, preserving the integrity of the supervisory function is difficult. To ensure its effectiveness, the supervisory function is typically highly invisible and it is exactly this invisibility that makes it vulnerable to (often very subtle) interference, from both politicians and the supervised entities. Government interference, very often under the form of granting forbearance—letting institutions continue to breach regulations unpunished, not enforcing sanctions—takes place in many countries. In isolated cases, it may lead to the prolongation of the life of insolvent institutions (and, therefore, lead to unfair competition and higher costs for the taxpayer at a later stage); while in more extreme cases it may threaten the stability of the sector and lead to systemic problems. All this justifies high quality governance.

A prerequisite for good regulatory governance is **firm institutional underpinnings**. Das and Quintyn (2002) identified four components that bring together the elements that form the basis for good regulatory governance: independence, accountability, transparency, and integrity. Box 2 elaborates on these four components.

The components interact and reinforce each other at various levels in supporting good governance. Independence and accountability are two sides of the same coin. Transparency supports the three others. It is a vehicle for safeguarding independence. By making actions and decisions transparent, chances for interference are reduced. It is also a key instrument to make accountability work. Transparency also helps to establish and safeguard integrity in the sense that published arrangements provide even better protection for an agency staff. Independence and integrity also reinforce each other. Legal protection of agency staff, as well as clear rules for appointment and removal of agency heads, support both their independence and integrity. Finally the pair accountability-integrity is also mutually reinforcing. Because of accountability requirements, there are additional reasons for heads and staff to keep their integrity.

C. Index of Regulatory Governance

The construction of the RGI is based on the above framework. The value of a country's index is computed as the weighted combination of the country's compliance with the four aforementioned components, derived from the assessments undertaken as part of the FSAP

Box 2. Institutional Basis for Good Governance 1/

Independence

One way to reduce the likelihood of interference in the regulatory process is to establish adequate independence arrangements. The regulatory agency should be insulated from improper influence from the political sphere and from the supervised entities.

Two main arguments have been offered in favor of delegating to independent agencies—as opposed to a government agency, a specific ministry, or a local body—the tasks related to economic and social regulation: the advantage of resorting to and relying on expertise, particularly when responses are needed for complex situations; and the advantage of potentially shielding market intervention from political interference, thus improving transparency and stability of the output. As such, agency independence increases the possibility of making credible policy commitments.

Accountability

Effective independence, however, cannot be achieved without accountability. Accountability is essential for the agency to justify its actions against the background of the mandate given to it. Independent agents should be accountable to those who delegated the responsibility—the government or the legislature—but also to those who fall under their functional realm, and to the public at large (stakeholders).

Transparency

Transparency refers to an environment in which the agency's objectives, frameworks, decisions and their rationale, data and other information, as well as terms of accountability are provided to the public in a comprehensive, accessible, and timely manner (IMF 2000).

Transparency has increasingly been recognized as a “good” in itself, but it also serves other purposes related to the other components of governance. As a “good” in itself, policy makers have been recognizing that globalization in general and the integration of financial markets and products in particular require a greater degree of transparency in monetary and financial policies, and in regulatory regimes and processes, as a means of containing market uncertainty. In addition, transparency has become a powerful vehicle for countering poor operating practices and policies.

Integrity

Integrity refers to those mechanisms that ensure that staff of the agencies can pursue institutional goals without compromising them due to their own behavior, or self-interest. Integrity affects staff of regulatory agencies at various levels. Procedures for appointment of heads, their terms of office, and criteria for removal should be such that the integrity of the board-level appointees (policy making body) is safeguarded. Second, the integrity of the agency's day-to-day operations is ensured through internal audit arrangements, which ensure that the agency's objectives are clearly set and observed, that decisions are made, and accountability is maintained. Thus, ensuring the quality of the agency's operations will maintain the integrity of the institution and strengthen its credibility to the outside world. Third, integrity also implies that there are standards for the conduct of personal affairs of officials and staff to prevent exploitation of conflicts of interest. Fourth, assuring integrity also implies that the staff of the regulatory agency enjoys legal protection while discharging their official duties. Without legal protection, objectivity of staff would be prone to contest—and staff to bribery or threat—and the overall effectiveness and credibility of the institution would suffer.

1/ Das and Quintyn (2002).

(Appendix III).²⁷ The weights of the four components are derived from the methodology developed by Sundararajan, Das, and Yossifov (2003), who constructed a similar index on transparency in monetary and financial policies. The index only pertains to the banking sector supervisors, in line with the FSSI definition.²⁸ Figure 2 shows the mean value of the RGI for the three groups of countries. RGI values for advanced countries are higher than those for transition and developing countries.

IV. EMPIRICAL MODEL AND FINDINGS

A. Selection of Variables

To verify the impact of regulatory governance on financial stability, we estimate the correlation between the two indices, using a multivariate cross-sectional analysis in which the RGI index acts as an explanatory variable along with a set of control variables.²⁹

Three sets of control variables, consistent with recent policy and academic work on the determinants of financial stability were used to account for (a) the macroeconomic impact; (b) the structure of the financial system; and (c) the broader institutional and governance environment.³⁰ Detailed data definitions and data sources are provided in Appendix IV.

- The **macroeconomic environment** is captured by three indicators. The first is a measure of the government's fiscal position. The expected sign is positive (a better fiscal position has a positive impact on soundness). The other variables are the rate of inflation and short-term real interest rates, which may affect financial soundness through likely effects on the quality of bank assets. Each of these variables is expected to have a negative impact on financial system soundness.

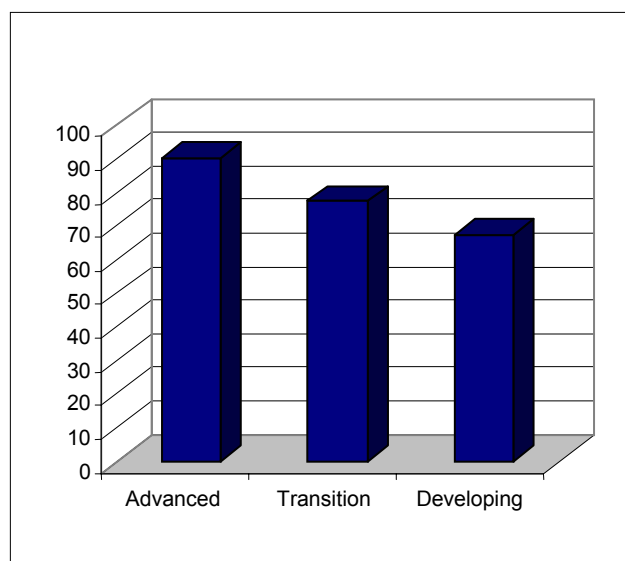
²⁷ The two international standards and codes used for constructing this index are the IMF's Code of Good Practices on Transparency in Monetary and Financial Policies (MFP Transparency Code); and the Basel Core Principles for Effective Banking Supervision.

²⁸ Section V discusses the broader index, which includes insurance sector supervisors.

²⁹ The sample includes those countries that have participated in the FSAP and for which a complete set of data for 2001 was available. Although the number of observations available for the regression analysis changes, depending upon the variables included in the regressions, the coverage is approximately 50 countries.

³⁰ See Chang and others (2003) for an overview. Attention has been placed on what we refer to as the "three crucial pillars of financial stability," namely the appropriate macroeconomic structure (first pillar), an effective regulatory and supervisory system (second pillar), and a robust financial infrastructure (third pillar). A key element of the second and third pillar is the governance nexus (see Appendix III).

**Figure 2. Regulatory Governance Index
(Banking Supervision)**



Source: Own calculations.

- Variables reflecting the **structure of the banking sector** are the share of government-owned and foreign-owned banks in the system and a measure of bank concentration. Foreign-owned banks are expected to have a positive impact on stability because they bring in new know-how, risk management systems and good governance from their parent company. As it turned out, the variable was insignificant in all specifications, indicating that the impact of foreign banks on domestic financial stability is not unequivocal. The impact of both other variables is a priori uncertain.³¹
- Finally, a set of variables on the broader **institutional and governance environment** was introduced. We include variables compiled by the International Country Risk Guide (ICRG), Freedom House (2001), and Kaufman, Kraay and Zoido-Lobaton (2002) on aspects of public sector governance.

³¹ On the use of these variables, see also Barth, Caprio, Levine (2000), and (2001), Barth, Nolle and others (2002), Beck, and others (2003), and Demirgüç-Kunt and Detragiache (1998). For a discussion on the role of government owned institutions on financial (in)stability, see La Porta, R. and others (2002) and Andrews (2004).

B. Regressions Results

The theoretical analysis suggests the following reduced framework form for analyzing the effect of regulatory governance on financial soundness:

$$FSSI_i = f(\text{MACRO}_i, \text{STRUCT}_i, \text{RGI}_i, \text{PSGOV}_i) + \mu_i \quad (1)$$

where $FSSI_i$ is the financial system soundness index in country i and μ_i is the random error term. MACRO_i , STRUCT_i , RGI_i , and PSGOV_i are measures for the macroeconomic environment, the structure of the banking system, regulatory governance, and public sector governance respectively. The tables report standardized coefficients for the core regressions, so that the estimated effects of those variables can be compared directly. The bivariate relationships between financial soundness and each of the potential explanatory variables reveal a significant relationship. Figures 3a and 3b plot RGI against FSSI.³²

The two figures demonstrate the interconnectedness between both indices. The bivariate correlation is 0.645, significant at the 1 percent level. Appendix V presents scatter-plots concerning the other potential explanatory variables. All the plots show a relationship between financial system soundness and its possible determinants. Thus, any or all of them have the potential to explain cross-country levels of financial system soundness.

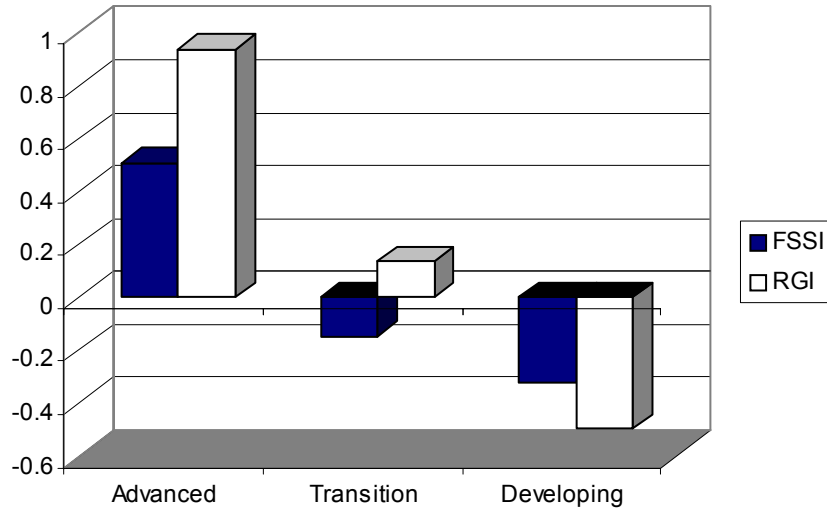
Weighted least squares results

In a first round, the impact of regulatory governance on financial system soundness is estimated by using a WLS. The use of ordinary least squares (OLS) is not appropriate because the White test revealed the presence of heteroskedasticity in the residuals, a very common problem in cross-section analyses.³³

³² To facilitate comparison, Figure 3a presents the mean of the standardized value of both indices.

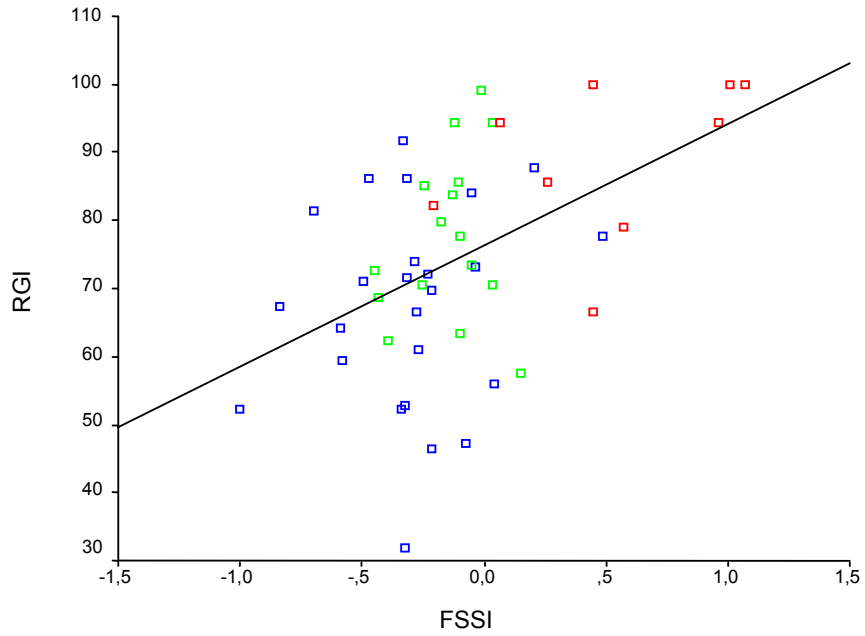
³³ In case of heteroskedasticity, OLS is not an appropriate estimation technique for it is not efficient when the model does not fulfil the classical assumptions of the standard linear regression model.

Figure 3a. Regulatory Governance Versus Financial System Soundness



Source: Own calculations

Figure 3b. Financial Stability As a Function of Regulatory Governance



Source: Own calculations.

The regression results are shown in Table 1. The columns correspond to different model specifications. Model 1 concentrates on the regulatory governance variable, while models 2 to 7 test the impact of regulatory governance in conjunction with the other sets of variables on the macroeconomy, the structure of the banking systems and the public sector governance (as measured by a set of three: democratic accountability, absence of corruption, and law and order).³⁴

Throughout the specifications, regulatory governance always has a positive and significant coefficient, suggesting that a better regulatory governance framework tends to strengthen and enhance financial system soundness. This result proves robust regardless of the model specification.

As expected, financial system soundness tends to be associated with low fiscal deficit (or high surplus), low real interest rate, and low inflation. The presence of government-owned banks and of a large degree of concentration in the sector is negatively and significantly correlated to financial stability.³⁵ The results also indicate that the quality of public sector governance has a direct positive impact on financial system soundness. In sum, the WLS regression results support the view that a better governance framework is associated with higher scores in the index of financial system soundness, other things being equal.

An interesting question is whether the quality of overall public sector governance affects the **relationship** between regulatory governance and financial system soundness, as is assumed by the governance nexus. This question is explored in Column 7, where we introduce an interaction variable between RGI and public sector governance. The positive and significant coefficient that is obtained for this interaction variable indicates that the impact of regulatory governance on financial stability is stronger, the higher the quality of public sector governance is. Thus, improving regulatory and supervisory practices will have a stronger impact on financial system soundness in countries where the overall quality of public sector governance is strong and well founded.

³⁴ Summary statistics and correlations among variables are available from the authors.

³⁵ This result supports the view that higher bank concentration is more likely to introduce instability. For arguments supporting this view, see among others Mishkin (1999) and Boyd and de Nicoló (2003). As Beck and others (2003) note, empirical evidence supporting this view, or the opposing view (concentration leads to more stability) is still scarce.

Table 1. Weighted Least Squares Regression Results

Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Regulatory governance RGI	0,696*** (6,570)	0,331** (2,263)	0,291* (1,761)	0,282* (1,796)	0,304** (2,269)	0,157* (1,710)	0,294** (2,151)
Government-owned banks		-0,283** (-2,446)	-0,284** (-2,382)	-0,271*** (-2,197)	-0,323*** (-3,302)	-0,339*** (-3,992)	-0,388*** (-3,607)
Fiscal balance		0,317** (1,997)	0,290* (1,723)	0,315*(6%) (1,906)			
Concentration				-0,232** (-2,234)	-0,258*** (-2,778)	-0,214** (-2,668)	-0,305*** (-3,228)
Inflation			-0,044 (-0,425)	0,039 (0,344)		0,073 (0,777)	-0,063 (-0,552)
Real interest rate			-0,077 (-0,540)	-0,016 (-0,113)			
Public sector governance					0,299*** (3,081)		1,695* (1,845)
Corruption						0,536*** (4,401)	
RGI* public sector governance							1,068* (1,558)
N	48	44	44	44	44	46	44
R ²	0,484***	0,628***	0,631***	0,675***	0,722***	0,768***	0,718
Adjusted R ²	0,473	0,600	0,583	0,622	0,677	0,739	0,672

*p<.1. **p<.05. ***p<.01.

Note: Dependent variable is financial system soundness. The regressions are estimated using WLS procedures, with t-values reported in parentheses. Real interest rate is the short-term real interest rate. Government-owned banks are the percentage of banking system's assets in total sector assets that is owned by the government. Inflation equals the logarithm of the average annual inflation rate 1998–2001. Public sector governance averages the three institutional measures by the ICRG: (i) bureaucratic quality; (ii) law and order; and (iii) democratic accountability.

Problems of possible endogeneity

One problem associated with the above results is that the RGI could be plagued by endogeneity, that is, may be correlated with the error term. It is indeed possible that the public sector governance and/or financial soundness indicators influence the quality of regulatory governance, in which case the results could be flawed.

To address this, the regressions were re-estimated using a two-stage least squares procedure (2SLS) whereby the RGI variable is replaced in the final regression by its predicted values, which are uncorrelated with the error term. At least one instrumental variable, uncorrelated with the error term, is used as explanatory variable in the first stage regression to model the predicted values for the RGI. The choice of adequate instruments for regulatory governance is not addressed thoroughly in the literature. In line with the theoretical framework outlined in this paper, our approach is to use public sector governance. The 2SLS results are presented

in Table 2. We first test whether the component of the regulatory governance index explained by public sector governance accounts for cross-country differences in financial system soundness. The results suggest that public sector governance influences financial stability through its impact on regulatory governance (Column 1), which is consistent with the governance nexus outlined in Box 1 and confirms our WLS results concerning the role of the political and institutional setting in enhancing financial system soundness. To examine the robustness of our results, we estimate various specifications and compare the results to the WLS estimates.

In addition, all specifications show that the impact of regulatory governance on financial system soundness remains positive and significant. Besides, its value is slightly larger and more significant than the corresponding coefficient estimates in WLS. Similarly, the sign and the level of significance of the control variables are virtually unchanged. Therefore, correcting for endogeneity of our regulatory governance index does not dramatically affect the regression results. Both sets of regressions (WLS and 2SLS) support the theoretical framework and show that the correlation between regulatory governance and financial system stability is positive, significant, and robust: regulatory governance does matter for financial system stability.

V. EXTENSION OF THE INDICES TO THE BROADER FINANCIAL SYSTEM

Current trends and developments are clearly indicating rapid changes in the structure of the global financial industry which is also affecting structures of national financial systems.³⁶ The mainstreaming of the insurance sector, as an integral component of the financial system and capital markets has been particularly notable in almost all developed and some developing countries.³⁷ An extension of the concepts and indices developed in this paper therefore becomes necessary to capture the broader notion of financial system soundness.

³⁶ The FSAP findings are increasingly showing how risks in corporate and nonbank financial sectors can pose risk to financial stability. Corporate sector analysis is bringing out the indirect credit risk to the banking system, just as risks to financial stability are being highlighted through the structural linkages between insurance and banking sectors, and the role insurance plays in optimizing allocation of risks and mobilizing long-term savings. The findings are also increasingly pointing out how banks and other financial institutions have begun to enter insurance business, using the capital markets for risk transformation. Both cross-border as well as cross-sectoral mergers and acquisitions are affecting business lines as well as ownership structures, and complex financial structures, both large and small are increasingly operating across sectors and markets.

³⁷ See Large (2003).

Table 2. Two-Stage Least Squares Regression Result

Independent Variables	WLS	2SLS	WLS	2SLS	WLS	2SLS	WLS	2SLS
Regulatory governance RGI	0,696*** (6,570)	0,699*** (6,703)	0,331** (2,263)	0,436*** (3,151)	0,291* (1,761)	0,495*** (4,287)	0,282* (1,796)	0,396*** (3,466)
Government-owned banks			-0,283** (-2,446)	-0,124 (-1,025)	-0,284** (-2,382)	-0,299*** (-3,078)	-0,271*** (-2,197)	-0,253** (-2,673)
Fiscal balance			0,317** (1,997)	0,303** (2,189)	0,290* (1,723)	0,147 (1,075)	0,315*(6%) (1,906)	0,204 (1,549)
Concentration							-0,232** (-2,234)	-0,202** (-2,361)
Inflation					-0,044 (-0,425)	-0,107 (-1,124)	0,039 (0,344)	-0,032 (-0,313)
Real interest rate					-0,077 (-0,540)	-0,202* (-1,829)	-0,016 (-0,113)	-0,171 (-1,518)
N	48	48	44	46	44	46	44	46
R ²	0,484***	0,489***	0,628***	0,563***	0,631***	0,726***	0,675***	0,755***
Adjusted R ²	0,473	0,478	0,600	0,533	0,583	0,632	0,622	0,715

*p<.1. **p<.05. ***p<.01.

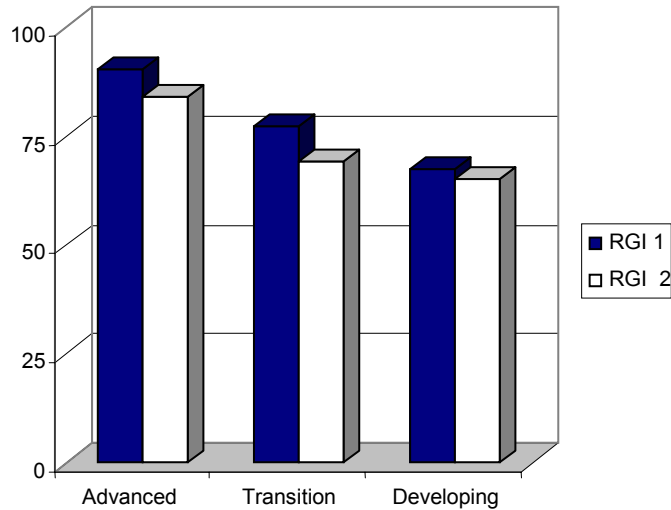
The insurance sector has traditionally been considered as relatively stable. However, the fact that insurance is no longer restricted to the traditional financial institutions has increased the vulnerability of the sector, representing its relevance to financial system stability. Das, Davies, and Podpiera (2003) and IMF (2003), therefore point out that indicators of financial system soundness should go beyond the banking sector. They propose a coherent set of financial soundness indicators to develop a macro-prudential supervisory framework for the broader sector. This analysis has now been formalized as part of the IMF-developed Financial Soundness Indicators, covering both the bank as well as the nonbank sectors.

However, the work on nonbank financial soundness is at an early stage and several technical, accounting, and definitional issues continue to affect the consistency and uniformity of nonbank sector data across countries. Large recently underlined the need to intensify our focus on the way capital adequacy and prudential supervisory techniques fit together for the different areas of the financial world, among which the insurance sector plays a major role (Large, 2003). The Joint Forum, in the context of better management of major individual risks in the banking, insurance, and securities sectors, has emphasized the need for risk management on an integrated firm-wide basis and endorsed a conservative regulatory capital framework, in the absence of reliable data and limitations posed by data across risk types. They have in fact emphasized a need for further advances in supervisory and regulatory data, given data and other related limitations. A construction of a broader index of financial stability covering banking and nonbank sectors (in this case, the insurance sector) is therefore premature and fraught with several methodological pitfalls.³⁸

With the available data it was possible to derive a broader regulatory governance index, which includes the insurance sector, using the same methodology and data sources used to construct the RGI for the banking sector. Figure 4 compares the two indices of regulatory governance covering banking and insurance. The results show that the value of the RGI declines when governance in the insurance regulatory and supervisory process is taken into consideration, suggesting that good governance practices are less widespread in the insurance sector than in the banking sector.

³⁸ See The Joint Forum (2003).

Figure 4. Regulatory Governance of Banking Supervision Versus a Broader Concept (Including Insurance Supervision)



Source: Own calculations.

This finding raises a flag that regulatory governance practices should catch up in order to support the soundness of those other sectors, and limit the chances that systemic problems arise in those parts of the financial system and spread throughout the entire system. The IAIS has recently recognized the importance of insurance sector for financial stability and the need for greater focus on a broader set of risks to avoid “contagious risks” being transferred from one sector or jurisdiction to another.³⁹ These findings also underline the need for national and international efforts at collecting and disclosing data on a uniform and consistent basis. In fact, further analyses are desirable to assess the real impact of insurance companies’ soundness on the soundness of the whole financial system.⁴⁰

VI. CONCLUSIONS AND RESEARCH AGENDA

In the two decades that have roughly elapsed since the New Institutional Economics School revived the attention for the importance of institutions and governance structures for the proper functioning of market-based economies, a growing amount of empirical evidence has

³⁹ See IAIS (2003a) and (2003b).

⁴⁰ The Financial Stability Forum recently recognized the need for further development of risk assessment concepts and methods in the nonbank sector. See Financial Stability Forum (2002).

been emerging on the primacy of institutions (and the importance of governance) for economic development and macroeconomic growth.

This paper has focused on a narrower, but highly important part of this research agenda. It analyzes the effect of regulatory governance—governance practices adopted by financial system regulatory agencies—on financial system soundness. Much as it is a narrow and often under-appreciated issue, focus on regulatory governance is gaining importance in the context of the broader financial stability agenda. The search for the determinants of financial stability is ongoing. A consensus is emerging that among those determinants, governance practices of all financial system stakeholders are a crucial factor underpinning the “three pillars of financial stability” (sound macroeconomic conditions, effective regulation and supervision, and robust market infrastructure).

To date no systematic and empirical analysis has been undertaken to test the linkage between regulatory governance and financial system soundness. The results of the exploration undertaken in this paper are encouraging. Regulatory governance does matter for financial system soundness, and thus influences financial stability. Along the road of this exploration, the paper also provides additional contributions to the discussions on, and measurement of, the concepts of financial stability and regulatory governance.

First, the paper defines a financial system soundness index. This allows measuring the degrees of financial (in)stability, in contrast with other approaches that used the crisis/no crisis contrast to measure the impact of other variables on financial system development and quality. The use of an index opens doors to other applications, such as the definition of a threshold as an early warning system for banking problems.

Second, building upon earlier work in Das and Quintyn (2002)—which identified independence, accountability, transparency, and integrity as the four key institutional underpinnings for good regulatory governance—the paper constructs an index of the quality of regulatory governance. This too opens further possibilities in the measurement of institutional, financial policy, and regulatory strengthening and its relationship with financial system risk factors.

Relating the two indices to each other, we estimate the impact of regulatory governance on financial system soundness, along with the impact of a set of control variables covering macroeconomic conditions, the structure of the financial system, and aspects of the quality of institutions and public sector governance. Throughout the specifications, the results consistently confirm the importance of good regulatory governance for financial system soundness. They also confirm that the broad institutional framework as well as public sector governance matter. These two determinants exert a direct impact on financial system soundness, but they also operate indirectly: the impact of the quality of regulatory governance is greater when supported by sound public sector governance.

The lessons from these findings are straightforward for policymakers: emphasis on strengthening good regulatory governance will pay off in terms of financial system

soundness. This implies that emphasis is needed on proper and balanced arrangements for independence, accountability, transparency, and integrity of regulatory agencies to improve financial system governance. At the same time, improvements in overall public sector governance also will contribute to institutional strengthening and soundness of the financial system.

This paper is a work progress in the area of regulatory governance issues and, more broadly, on the topic of financial stability. The concepts developed here set the stage for further research and policy applications. Besides expanding the number of countries in the sample, as and when they become available, empirical work could proceed along three lines: (i) developing the FSSI for the broader financial system, given the growing interconnections among banks and other segments of the financial system—this requires, in the first place, the collection of a proper and consistent set of indicators for those nonbank segments of the financial system closely linked with the banking system—while work in this area is in the very early stages, our preliminary findings on the lower quality of regulatory governance in the nonbank sector make this an urgent task; (ii) fine-tuning the FSSI index by including other indicators, such as measures of liquidity and indicators for the quality of financial market infrastructure; and (iii) developing time series to ascertain whether the adoption of international standards and codes and institutional changes (such as unification of the supervisory functions), improve the quality of regulatory governance and, through it, financial system soundness.

Translation of some of the work into the policy-making field could include experiments with defining thresholds for the soundness indices for individual countries as part of an early warning system, for instance in the spirit of Potter (1995). Such an approach would retain the appeal of indices and combine it with the discrete variable approach.

Construction of the FSSI Index

The FSSI is composed of two Financial System Indicators (FSIs), the CAR, and NPLs. Several other potential FSIs could be chosen to construct the index. Evans and others (2000) list a set of quantitative and qualitative macroprudential indicators, reflecting the CAMEL-approach: measures of capital adequacy, asset quality, management soundness, earnings, liquidity, and sensitivity to market risk.

The construction of our index is in part guided by data limitations. We faced a trade-off between a wider set of indicators for a smaller number of countries, and a smaller set of indicators for a larger number of countries. For the purposes of this paper, the latter approach seemed more desirable. On these grounds, the index is still work in progress.⁴¹ There is room to improve and fine-tune the measure when more data become available in the future.

One problem with using aggregate measures is the choice of weights in the aggregation. Short of a well-specified model that provides theoretical weights for the individual variables that are included in our FSSI index, we decided not to apply a specific weight to the two variables. We first inverted the values of the NPLs ratio to make the two variables consistent with each other (higher values referring to greater financial stability). The subindicators were then standardized by subtracting the mean and dividing by the standard deviation.

The index was subsequently weighed to reflect the country's degree of financial intermediation, an approach that seems advisable when undertaking an international comparison. The weighing is done on the basis of each country's share of bank credit to the private sector in GDP.

The index is specified as follows:

$$\text{FSSI} = \text{credit/GDP} * [1/2 (\text{CAR} + \text{NPLs})] \quad (2)$$

⁴¹ Although data were available for profitability, we did not include this measure in the final index, the rationale being that profitability as an indicator is difficult to interpret which would make its contribution to the soundness indicator ambiguous. In highly competitive markets, profits can be relatively low without, however, indicating a lack of soundness. Likewise, in noncompetitive markets, profits can be high because of a lack of competition, or low because of inefficiencies.

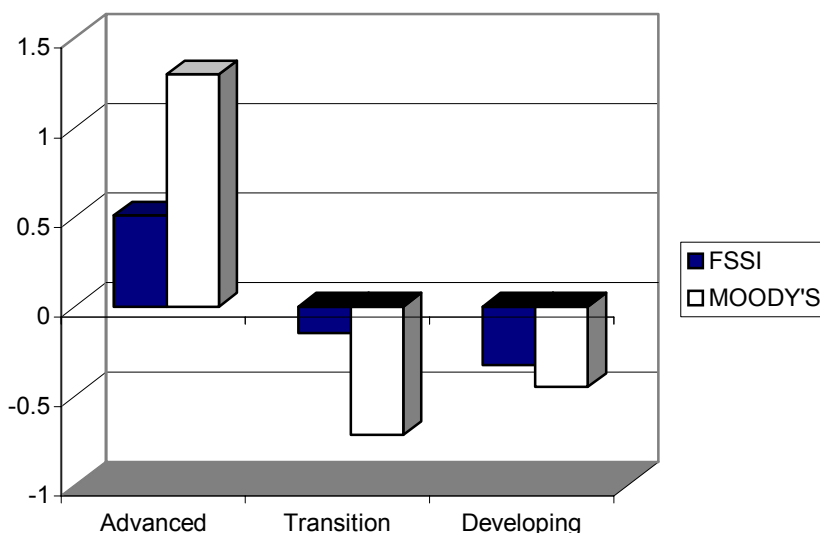
FSSI and Moody’s Bank Financial Strength Index: A Comparison

This appendix compares the FSSI for the banking sector constructed in this paper with Moody’s bank financial strength index, which is another well-known composite index of financial stability.⁴²

The rating agency defines its index as follows: “Factors considered in the assignment of Bank Financial Strength Ratings include bank-specific elements such as financial fundamentals, franchise value, and business and asset diversification. Although Bank Financial Strength Ratings exclude the external factors specified above, they do take into account other risk factors in the bank’s operating environment, including the strength and prospective performance of the economy, as well as the structure and relative fragility of the financial system, and the quality of banking regulation and supervision.”

Figure 5 compares the two measures using the mean of the indices for 10 advanced, 10 transition, and 13 developing countries (WEO Classification) for which our FSSI index was calculated and for which a Moody’s rating is available.

Figure 5. Comparing Two Indexes of Financial Stability



Source: Own calculations.

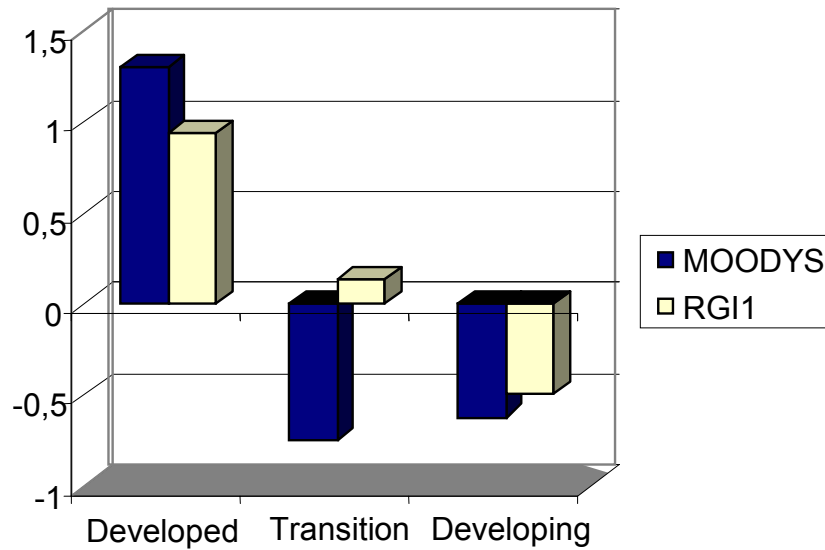
Both indices exhibit a close pattern for advanced and developing countries. The correlation coefficient between both is 0.741 and is significant at the 0.1 percent level. However, the mean value of our measure of financial system soundness for transition countries is greater

⁴² Moody’s financial strength index is constructed by the authors according to a numerical scale assigned to Moody’s (by assets) weighted average bank ratings by country.

than Moody's measure,⁴³ suggesting that Moody's evaluation of the financial strength of a transition country will in general be lower than our index.

For information, Figure 6 compares Moody's financial strength index and our measure of regulatory governance.

Figure 6. Regulatory Governance and Moody's Measure of Financial Strength



Source: Own calculation.

⁴³ Moody's maintains financial strength ratings only for the most important individual banks in the country whereas our measure of financial soundness is a system-wide index.

Construction of the Regulatory Governance Index

The regulatory governance index captures how the different countries perform in terms of some internationally accepted practices underpinning regulatory governance. To develop this index, we used the assessments of country observance of the different international standards conducted through the FSAP.

Evaluation of governance practices under the FSAPs

Under the FSAP, the key financial sector standards that provide information for the construction of a regulatory governance index are (a) the MFP Transparency Code; and (b) regulatory standards in the main areas of financial sector oversight—Basel Core Principles for Effective BCP; IOSCO; and International Association of IAIS.

For the banking sector index, the value a country's regulatory governance index was computed as the unweighted average of the overall assessments of the country's observance of the governance-related practices of the MFP Transparency code for banking supervision and the BCP. For the broader governance index, we added the assessments of observance of the governance-related practices of the IAIS the IOSCO Core Principles.⁴⁴ The MFP Transparency Code provides a comprehensive framework for evaluation of the transparency aspects of accountability and integrity, in addition to transparency itself. BCP, IAIS, and IOSCO provide assessments of independence:

Accountability

Is composed of (i) **general accountability**—encompassing the availability of regulatory agencies' officials to explain their institution's objectives and performance to the public; (ii) **published accountability**—where the financial agencies issue periodic public reports on the policies used in the pursuit of their overall objectives and the developments in the financial sectors under their jurisdiction; (iii) **financial accountability**—disclosure of financial agencies' audited financial statements and of the underlying accounting policies, aggregate market transactions, and operating revenues and expenses.

Integrity

The **integrity of the regulator consists of** public disclosure of procedures for appointment, terms of office, and dismissal of financial agencies' officials; codes of conduct regulating

⁴⁴ The latter sample of countries is much smaller, because to comply with homogeneity requirements, we retained only those countries for which information was available across standards and codes assessments.

staff's personal financial affairs and conflicts of interest; and any legal protections for officials and staff of financial agencies.

Transparency

Regulatory policy transparency, comprising (i) general—encompassing the public disclosure and explanation of the regulatory framework and financial agencies' operating procedures, of significant changes in financial policies, and advocating public consultations of proposed substantive changes in financial regulations; and (ii) oversight of consumer protection and client asset protection schemes—specifically requiring public disclosure of the nature, form, source of financing, and performance of client asset protection schemes, and of information on any consumer protection arrangements operated by financial agencies.

Transparency of regulatory operations, consisting of (i) general—requiring clear definition of the broad objectives and institutional framework of financial agencies, public disclosure of their responsibilities, and procedures for appointment, terms of office, and dismissal of financial agencies' officials; and (ii) cross regulatory—interaction with other financial agencies, covering public disclosure of the relationship between various financial agencies, including formal procedures for information sharing and consultation, and between financial agencies and any self-regulatory organizations under their oversight.

Independence

The international financial sector regulatory standards focus on the independence aspect of regulatory governance. All regulatory standards require that the regulators have **operational independence** and that the rules and regulations are applied in a consistent manner to all regulated entities.

Construction of the index

The construction of the index proceeded as follows:⁴⁵

For each practice of each code, the country's degree of observance was coded as follows:

- 1 = noncompliance
- 2 = partial compliance
- 3 = broad compliance
- 4 = full compliance
- 9 = not applicable/not answered

⁴⁵ For more details on this scoring method, see Sundararajan, Das, and Yossifov (2003).

In the MFP Transparency Code, some dimensions of transparency are not applicable for all practices. Consequently, when a practice was relevant to several dimensions, it was given a higher weight according to the following rule: a practice would count double when it was relevant to two different dimensions of transparency, it would count triple if it was relevant to three dimensions and four times if it was relevant to the four dimensions altogether. The rationale for this weighting scheme is that the practices that are relevant to several dimensions are more important.

Each country was then assigned a score on the assessments of observance of each code using the following weighting scheme:⁴⁶

$$\text{SCORE}_{ij} = [0 * \text{noncompliance}_{ij} + 0,33 * \text{partial compliance}_{ij} + 0,66 * \text{broad compliance}_{ij} + \text{full compliance}_{ij}] * 100 \quad (3)$$

where *i* represents the country and *j* the specific set of standards and codes.

We then averaged each country's scores on each code to derive the country's RGI.

$$\text{RGI}_i = 1/n (\sum \text{SCORE}_{ij}) \quad j = [1, n] \quad (4)$$

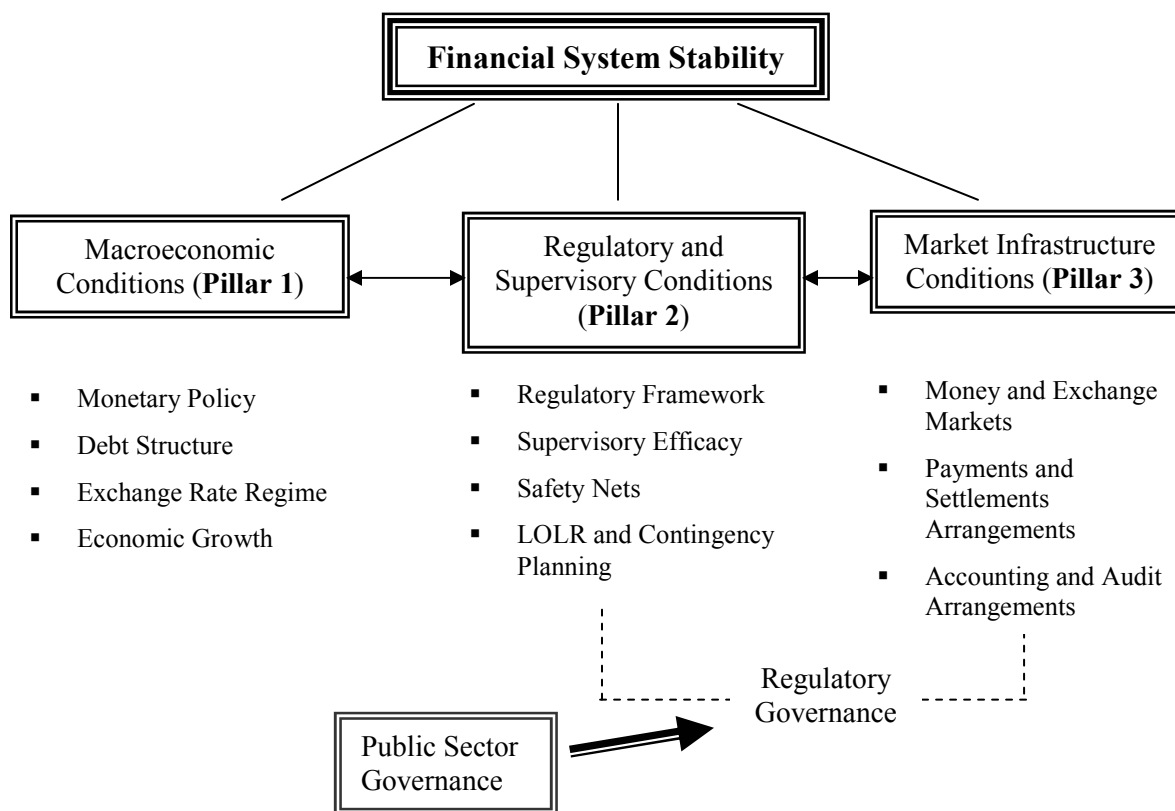
Where *n* is the number of codes used to derive the index.

⁴⁶ Only the valid scores were taken into consideration (e.g., questions that were not answered by the country or were marked as not being applicable was not included in the set of questions used in the estimation of the country's score).

Financial Stability and Its Three Pillars

For national financial systems to function on a stable basis, a combination of stable macroeconomic conditions, effective regulatory and supervisory systems, and a robust market infrastructure are essential. These can be regarded as the three crucial pillars of financial stability (Figure 7).

Figure 7. Financial System Stability: The Three Pillars



The **first pillar** supports financial stability through the existence of sound and sustainable macroeconomic policies. These help ensure the policy environment essential for a well functioning financial system, such as a well established and consistent exchange rate regime, a credible monetary policy, and sufficient reserves to meet potential systemic liquidity shortages. The **second pillar** supports financial stability through the existence of a regulatory and supervisory system that strengthens the system’s resilience through effective oversight on the prudential condition and financial soundness of the financial system. The elements of this pillar include aspects such as effective consolidated supervision, supervisory cooperation, and a risk orientation in supervisory practices. The resilience is imparted through adoption of international regulatory practices, and off-site supervisory surveillance, ensuring that financial institutions are well capitalized and strong to absorb losses from most shocks. The **third** and final pillar, relates to a robust financial system infrastructure. This

pillar is often assumed and hence, less emphasized.⁴⁷ Several elements of this pillar are key in supporting financial stability: liquidity and market infrastructure, reliable legal system, accounting and auditing practices, transparency and disclosure, and the corporate governance regime. The robustness of this pillar is key for the effective management of credit, market, and liquidity risk by institutions, including exchange rate risk. Transparency, and well-founded disclosure helps support effective market discipline by financial institutions, including a better understanding of off-balance sheet activities, and cross border linkages.

Governance and the three pillars

Regulatory governance underpins the second and the third pillars the most, since it relates to the governance practices of those agencies that regulate and supervise and have an oversight role on the financial infrastructure. Good regulatory governance affects the capacity to formulate, implement, and enforce financial policies and regulations, and make refinements to the financial infrastructure in response to changes in the structure of the financial system and behavior of the stakeholders. A prerequisite for good regulatory governance however, is the existence of a credible and broader framework of public sector governance. This is necessary to establish a firm institutional and accountable basis for the conduct of regulatory governance.

Financial stability analysis and the three pillars

These three pillars are also reflected in the framework being used in the financial stability analysis applied in the FSAP. The framework covers vulnerabilities and capital adequacy of the financial sector, emphasizes on the macro-financial linkages, and takes into account the risks posed by the regulatory regime and associated structural impediments.

In developing the financial soundness indicators, as a tool for undertaking the analysis of financial system stability, indicators have been developed for each of the three pillars, and the analysis framework includes a combination of tools, in addition to the risks and vulnerabilities relating to each pillar based on the analysis of the financial soundness indicators (Craig and Sundararajan (2003) and IMF (2003)). In particular, reliance is given to a system's observance with internationally accepted standards in assessing financial strengths and vulnerabilities, and macro-financial linkages between the financial sector and macroeconomic conditions.⁴⁸

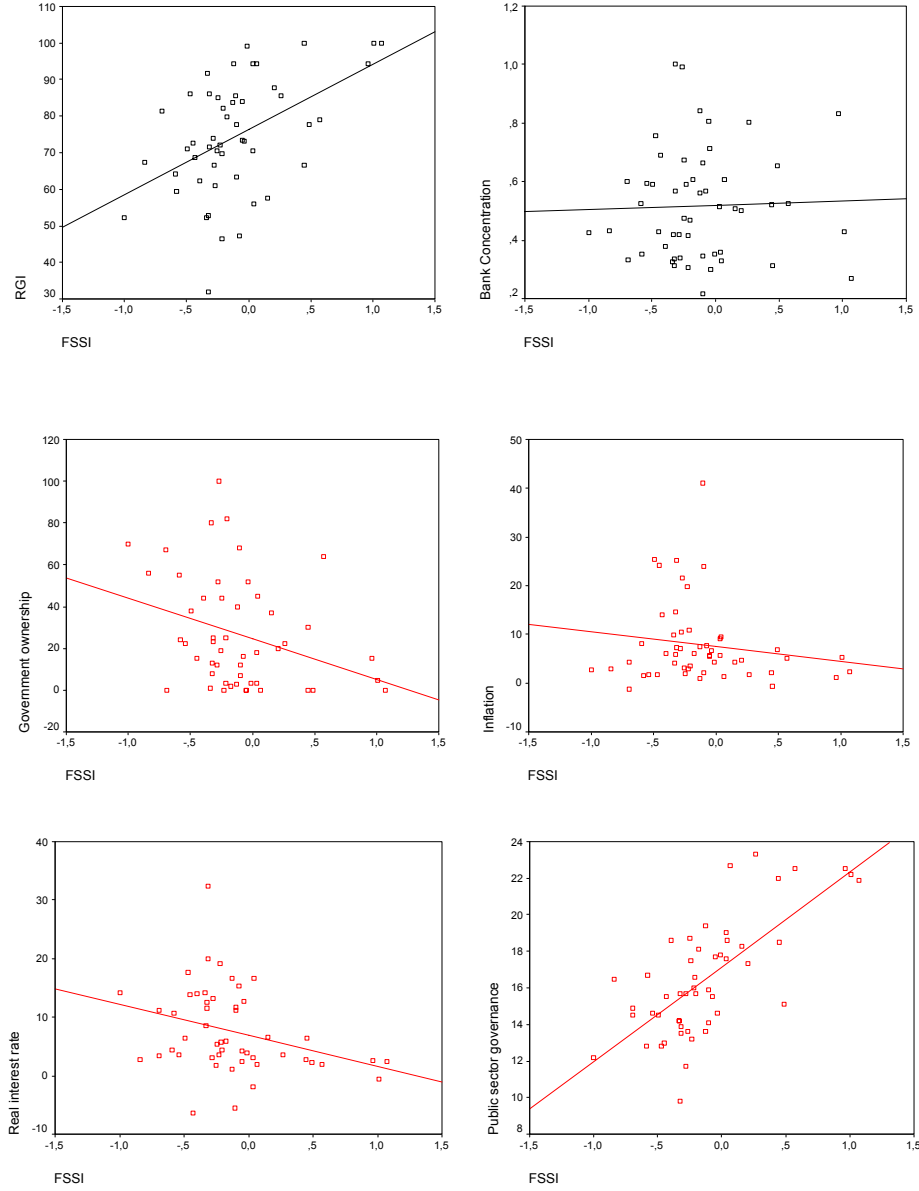
⁴⁷ Crockett (2003) and Financial Stability Forum (2002).

⁴⁸ See also various IMF reviews of regulatory vulnerabilities in banking, insurance, and securities sectors, pointing out how the shortcomings relating to regulatory governance arrangements were identified as potential risk factors affecting financial stability (IMF, 2003).

Definitions and Data Sources for Variables Included in the Regression

Variable Name	Definition	Source
Financial system soundness	Aggregate economy wide index	IMF, Authors' calculations from FSAPs
Regulatory governance (banking sector)	Composite economy wide indicator	IMF, Authors' calculations from FSAP assessments
Regulatory governance (financial sector)	Composite economy wide indicator	IMF, Authors' calculations from FSAP assessments
Fiscal balance	Measure of central government fiscal balance as a percentage of GDP	IFS
Short term real interest rate	Nominal lending rate minus the contemporaneous rate of inflation	IFS
Inflation	Annual rate of change of the GDP deflator	IFS
State ownership	Percentage of banking system owned by the government	Barth, Caprio, and Levine (2001) database and authors' calculations
Bank concentration	Share of deposits of five largest banks in total deposits	Barth, Caprio, and Levine (2001) database and authors' calculations
Foreign ownership	Percentage of banking system owned by foreign investors	Barth, Caprio, and Levine (2001) database and authors' calculations
Public sector governance	Average of three politico-institutional variables: democratic accountability, bureaucratic quality and law and order	International Country Risk Guide (ICRG)
Government effectiveness	Aggregate economy wide Index	Kaufmann and Kraay (2002)
Control of corruption	Aggregate economy wide Index	Kaufmann and Kraay (2002)
Voice and Accountability	Aggregate economy wide Index	Kaufmann and Kraay (2002)
Regulatory burden	Aggregate economy wide Index	Kaufmann and Kraay (2002)
Overall freedom	Index	Freedom House (2001)

Figure 8. Financial Stability As a Function of Potential Explanatory Variables



REFERENCES

- Andrews, Michael, 2004, "State-Owned Banks, Stability, Privatization, and Growth: Practical Policy Decisions in a World Without Empirical Proof," IMF Working Paper (Washington: International Monetary Fund), forthcoming.
- Bank of International Settlements, "70th Annual Report," June 5, 2000. Available via the Internet at: <http://www.bis.org/publ/ar2000e.pdf>
- Barth, James, Gerard Caprio, and Ross Levine, 2000, "Banking Systems Around the Globe: Do Regulation and Ownership Affect Performance and Stability?" World Bank Policy Research Working Paper No. 2325 (Washington: World Bank).
- , 2001, "Bank Regulation and Supervision: What Works Best?" NBER Working Paper, No. 9323 (Cambridge, Massachusetts: National Bureau of Economic Research).
- Barth, James, Steven Caudill, Thomas Hall, and Glenn Yago, 2000, "Cross-Country Evidence on Banking Crises: Do Financial Structure and Bank Regulation Matter?" in *Bank Fragility and Regulation: Evidence from Different Countries*, ed. by George Kaufman (New York: Elsevier Science), pp. 3–23.
- Barth, James, Daniel Nolle, Triphon Phumiwasana, and Glenn Yago, 2002, "A Cross-Country Analysis of the Bank Supervisory Framework and Bank Performance," Economic and Policy Analysis Working Paper 2002–2 (Washington: Office of the Comptroller of the Currency).
- Beck, Thorsten, Asli Demirguc-Kunt, and Ross Levine, 2003, "Bank Concentration and Crises," NBER Working Paper No. 9921 (Cambridge, Massachusetts: National Bureau of Economic Research).
- Borio, Claudio, 2003, "Towards a Macro-Prudential Framework for Financial Supervision and Regulation BIS," Working Paper No. 128 (Basel: Bank for International Settlements).
- , and William White, 2003, "Whither Monetary and Financial Stability? The Implications of Evolving Policy Regimes," Paper presented at the symposium "Monetary Policy and Uncertainty: Adapting to a Changing World," Jackson Hole, Wyoming, August.
- Boyd, John, and Gianni de Nicoló, 2003, "Bank Risk Taking and Competition Revisited," IMF Working Paper 03/114 (Washington: International Monetary Fund).

- Brealey, Richard, Alastair Clark, Charles Goodhart, Juliette Healey, Glenn Hoggarth, David T. Llewellyn, Chang Shu, Peter Sinclair, and Farouk Soussa, 2001, *Financial Stability and Central Banks. A Global Perspective*, Central Bank Governors' Symposium Series (London: Routledge).
- Caprio, Gerard, and Ross Levine, 2002, "Corporate Governance in Finance: Concepts and International Observations," in *Financial Sector Governance: the Roles of the Public and Private Sectors*, ed. by R. Litan, M. Pomerleano, and V. Sundararajan (Washington: Brookings Institution).
- Chang, John, Alexandra Lai, Mark Illing, and Fred Daniel, 2003, "Essays on Financial Stability," Bank of Canada Technical Report No. 95 (Ottawa).
- Corsetti, Giancarlo, Paulo Resenti, and Nouriel Roubini, 1998, "Paper Tigers? A Model of the Asian Crisis," NBER Working Paper No. 6783 (Cambridge: National Bureau of Economic Research).
- , 1999, "The Asian Crisis: an Overview of the Empirical Evidence and Policy Debate," pp. 127–163, *The Asian Financial Crisis. Causes, Contagion and Consequences*, ed. by Pierre-Richard Agénor, M. Miller, D. Vines, and Weber, (Cambridge University Press (Cambridge U.K.)), 417 pp.
- Craig, Sean, and V. Sundararajan, 2003, "Using Financial Soundness Indicators to Assess Risks to Financial Stability," in *Challenges to Central Banking for Globalized Financial Systems*, ed. by Piero C. Ugolini, Andrea Schaechter, and Mark Stone, 2003, IMF.
- Crockett, Andrew, 1997. "Why Is Financial Stability a Goal of Public Policy?" pp. 7–36 in *Maintaining Financial Stability in a Global Economy: Proceedings of A Symposium Sponsored by the Federal Reserve Bank of Kansas City*, Jackson Hole, Wyoming.
- , 2003, "International Standard Setting in Financial Supervision," Institute for Economic Affairs Lecture (London: Cass Business School).
- Damania, Richard, Per Fredriksson, and Mani Muthukumara, 2003, "The Persistence of Corruption and Regulatory Compliance Failures: Theory and Evidence," IMF Working Paper 03/172 (Washington: International Monetary Fund).
- Das, Udaibir S., Nigel Davies, and Richard Podpiera, 2003, "Insurance and Issues in Financial Soundness," IMF Working Paper 03/138 (Washington: International Monetary Fund).
- Das, Udaibir S., and Marc Quintyn, 2002, "Crisis Prevention and Crisis Management: The Role of Regulatory Governance," in *Financial Sector Governance: the Role of the Public and Private Sectors*, ed. by R. Litan, M. Pomerleano and V. Sundararajan, (Washington: Brookings Institution).

- Demirgüç-Kunt, Asli, and Erika Detragiache, 1998, "Financial Liberalization and Financial Fragility," IMF Working Paper 98/831 (Washington: International Monetary Fund).
- Evans, Owen, Alfredo M. Leone, Mahinder Gill, and Paul Hilbers, 2000, *Macroprudential Indicators of Financial System Soundness*, IMF Occasional Paper No. 192 (Washington: International Monetary Fund).
- Ferguson, Robert Jr., 2002, "Should Financial Stability Be An Explicit Central Bank Objective?" paper presented at IMF conference "*Challenges to Central Banking from Globalized Financial Systems*," Washington, September.
- Financial Stability Forum, 2002, "Review of Vulnerabilities and Efforts to Strengthen the International Financial System." Available via Internet at: <http://www.bis.org/press/p020904.htm>.
- Freedom House, 2001, *Annual Survey of Freedom*. Available via Internet at: <http://www.freedomhouse.org/ratings/>, New York: Freedom House.
- Goldstein, Morris, Graciela L. Kaminsky, and Carmen M. Reinhart, 2000, *Assessing Financial Vulnerability: An Early Warning System for Emerging Markets* (Washington: Institute for International Economics).
- Goodhart, Charles, 2001, "Regulating the Regulators - Accountability and Control," in *Regulating Financial Services and Markets in the 21st Century*, edited by E. Ferran and C. Goodhart (Oxford: Hart Publishing).
- , 2002, "The Organizational Structure of Banking Supervision," Economic Notes. Banca Monte dei Paschi di Siena, Vol. 31. No. 1.
- Greene, William, 1997, *Econometric Analysis*, 3rd Edition (Upper Saddle River: Prentice Hall).
- Haldane, Andrew, Glenn Hoggarth, and Victoria Saporta, 2001, "Assessing Financial System Stability, Efficiency, and Structure at the Bank of England," in *Marrying the Macro- and Microprudential Dimensions of Financial Stability* (Basel: Bank for International Settlements).
- Hupkes, Eva, Marc Quintyn, and Michael Taylor, 2004, "The Accountability of Financial Sector Supervisors. Principles and Practice," IMF Working Paper (Washington: International Monetary Fund) (forthcoming).
- International Monetary Fund, 1999, *Code of Good Practices on Transparency in Monetary and Financial Policies* (Washington: International Monetary Fund).

- , 2000, Supporting Document to the Code of Good Practices on Transparency in Monetary and Financial Policies, July. Available via the Internet at: <http://www.imf.org>.
- , 2001, "Financial Soundness Indicators: Policy Paper," Available via the Internet at: <http://www.imf.org/external/np/mae/fsi/2001/eng/pp.pdf>. (Washington: International Monetary Fund).
- , 2003, "Financial Soundness Indicators," Available via the Internet: <http://www.imf.org/external/np/sta/fsi/eng/2003/051403.htm>
- International Association of Insurance Supervisors, 2003a, Insurance Core Principles and Methodology.
- , 2003b, *Stress Testing by Insurers, Guidance Paper, Guidance Report No. 8*.
- Issing, O., 2003, "Monetary and Financial Stability: Is there a Trade-Off?" in *Monetary Stability, Financial Stability and the Business Cycle: Five views*. BIS Papers No. 18, (Basel: Bank for International Settlements).
- Johnston, Barry, Jingqing Chai, and Liliana Schumacher, 2000, "Assessing Financial System Vulnerabilities," IMF Working Paper 00/76 (Washington: International Monetary Fund).
- Joint Forum (The), 2003, "Trends in Risk Integration and Aggregation."
- Kaufmann, D., 2002, "Public and Private Misgovernance in Finance: Perverse Links, Capture, and their Empirics," in *Financial Sector Governance: the Role of the Public and Private Sectors*, ed. by R. Litan, M. Pomerleano, and V. Sundararajan (Washington: Brookings Institution).
- , A. Kraay, and P. Zoido-Lobaton, 2003, "Governance Matters II; Updated Indicators for 2000-01," World Bank, Policy Research Working Paper, No. 2772.
- Kent, Christopher, and Guy Debelle, 1999, "Trends in Australian Banking System: Implications for Financial System Stability and Monetary Policy," Research Discussion Paper (Reserve Bank of Australia).
- Large, Andrew, 2003, "Basel II and Systemic Stability," paper presented at the Basel II-CAD 3 Conference, London, March.
- La Porta, R., Lopez-de-Silanes, F. and Schleifer, A., 2002, "Government Ownership of Banks," *Journal of Finance*, Vol. 57, No. 1, February, pp. 265–301.

- McDonough, William, 2002, "Promoting Financial Stability," *International Finance*, Vol. 5, No. 1, pp. 115–127.
- Mishkin, Frederic, 1991, "Anatomy of A Financial Crisis," NBER Working Paper No. 3934, (Cambridge: National Bureau of Economic Research).
- , 1997, "The Causes and Propagation of Financial Instability: Lessons for Policymakers," in *Maintaining Financial Stability in a Global Economy*. A symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming.
- , 1999, "Financial Consolidation: Dangers and Opportunities." *Journal of Banking and Finance*, 23, pp. 675–691.
- Padoa-Schioppa, Tommaso, 2002, "Central Banks and Financial Stability: Exploring the Land in Between," in Second ECB Central Banking Conference, "*The Transformation of the European Financial System*," Frankfurt, 24–25 October.
- , 2003, "Central Banks and Financial Stability," Remarks Presented at the Bank of Indonesia Conference, Jakarta, July.
- Potter, Simon, 1995, "A Non-Linear Approach to U.S. GNP," *Journal of Applied Econometrics*, Vol. 10, pp.109–125.
- Quintyn, Marc, and Michael Taylor, 2003, "Regulatory and Supervisory Independence and Financial Stability," *CESifo Economic Studies*, Vol. 49, No. 2, pp. 259–294.
- Rodrik, Dani, Arvind Subramanian, and Francesco Trebbi, 2002, "Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development," NBER Working Paper No. 9305 (Cambridge: National Bureau of Economic Research).
- Rossi, Marco, 1999, "Financial Fragility and Economic Performance in Developing Economies: Do Capital Controls, Prudential Regulation, and Supervision Matter?" IMF Working Paper 99/66 (Washington: International Monetary Fund).
- Schinasi, Garry, 2003, "Responsibility of Central Banks for Stability of Financial Markets," IMF Working Paper 03/121 (Washington: International Monetary Fund).
- Schwartz, Anna, 1986, "Real and Pseudo-Financial Crises," in *Financial Crises and the World Banking System*, ed. by F. Capie and Geoffrey E. Wood (New York: St. Martin's).

Sundararajan, V., David Marston, and Ritu Basu, 2001, “Financial System Standards and Financial Stability: The Case of the Basel Core Principles,” IMF Working Paper 01/62 (Washington: International Monetary Fund).

Sundararajan, V., Charles A. Enoch, Armida San Jose, Paul L. Hilbers, Russell C. Krueger, Marina Moretti, and Graham L. Slack, 2002, *Financial Soundness Indicators: Analytical Aspects and Country Practices*, IMF, Occasional Paper No. 212 (Washington: International Monetary Fund).

Sundararajan, V., Udaibir Das, and Plamen Yossifov, 2003, Cross-Country and Cross-Sector Analysis of Transparency of Monetary and Financial Policies, IMF Working Paper 03/94 (Washington: International Monetary Fund).

Tsatsaronis, K., 2002, “Systemic Financial Risk and Macroprudential Supervision,” paper presented at the Bocconi University Centennial Conference on “*Risk and Stability in the Financial System: What Roles for Regulators, Management, and Market Discipline?*”

Williamson, Oliver, 2000, “The New Institutional Economics: Taking Stock, Looking Ahead,” *Journal of Economic Literature*, Vol. XXXVIII, No. 3, September, pp. 595–613.

World Bank, “World Development Indicators.” Available via Internet at: <http://www.worldbank.org/data/wdi2001/index.htm>