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Indicators Of Financial Soundness Can They Forewarn Us Of Impending Crisis?

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In this paper we investigate how Financial Soundness Indicators (FSI) responds to changing macroeconomic and institutional conditions. FSIs are aggregate measures of the current financial health and soundness of financial institutions in a country including corporate and household counterparties. FSIs are now compiled and disseminated by a large number of national regulatory authorities. Post Asian Financial crisis revealed major gaps in the statistical coverage of both the domestic and external financial sectors which allowed serious vulnerabilities to remain undetected. Such gaps in information flows prohibited national authorities from taking timely and appropriate steps to improve conditions. More recently in the aftermath of the 2008 Credit Crisis financial regulators were pushed to explain why there was no official forewarning of the impending crisis. The paper documents various Financial Soundness Indicators employed by authorities to monitor the financial health of economies. The conclusion from surveying the available financial indicators is that these tools appear to have become more reliable and consistent especially in illustrating asset quality across groups of countries. However financial regulators require a better understanding and a more appropriate framework for assessing financial indicators if they are to position themselves at the forefront in providing warnings of impending crisis.

Field of Research: Financial Indicators, Credit Crisis, Macroeconomics

1. Introduction

In this paper we investigate how Financial Soundness Indicators (FSI) responds to changing macroeconomic and institutional conditions. FSIs are aggregate measures of the current financial health and soundness of financial institutions in a country including corporate and household counterparties. FSIs are now compiled and disseminated by a large number of national regulatory authorities. For instance, the International Monetary Fund (IMF) compile data on these indicators which were developed as a result of a number of initiatives employed by the IMF following the Asian financial crisis in the late 90s. The aftermath of the crisis revealed major gaps in statistical coverage of both the domestic and external financial sectors which allowed serious vulnerabilities to remain undetected. Such gaps in information flows prohibited national authorities from taking timely and appropriate steps to improve conditions.

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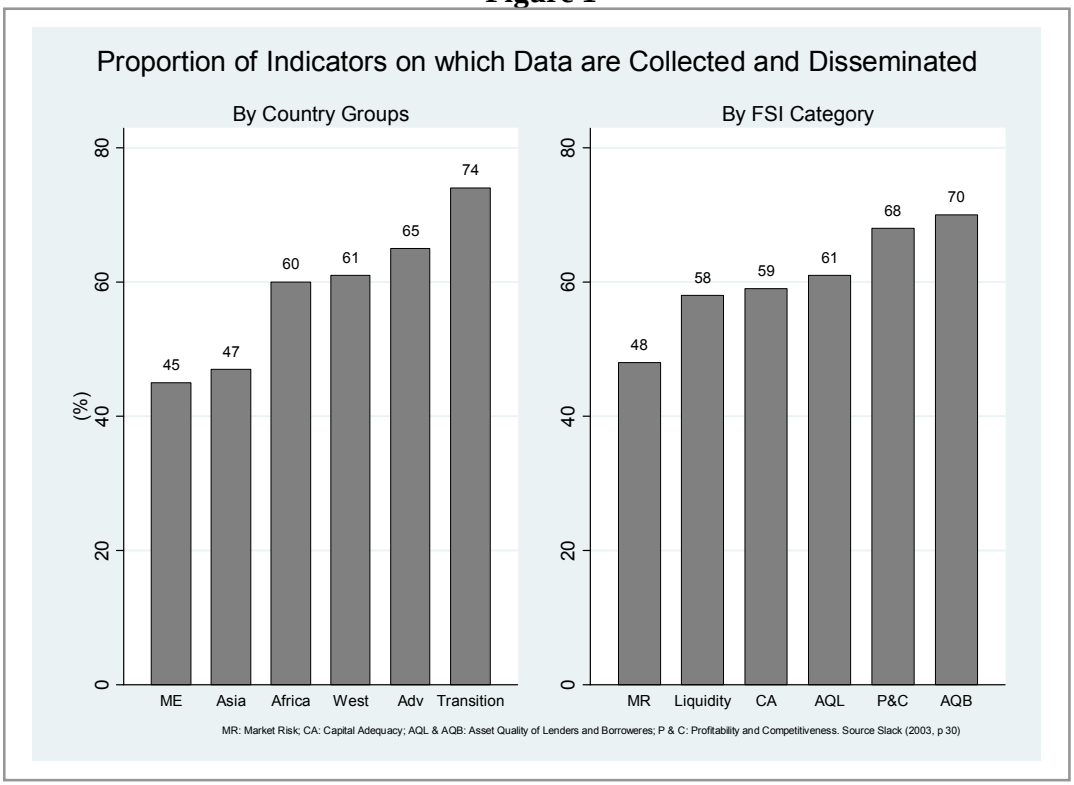
This paper is organized as follows: in the next section we present a summary of the history and development of FSIs, following that we explore in some detail a number of selected FSIs. In the final section we discuss apparent trends underlying these FSIs over the last few years.

2. History And Development Of (Fsis)

Promoting financial soundness and stability is now widely recognized as a primary responsibility for monetary and financial authorities employed with achieving economic growth and economic sustainability for their respective economies. The global financial crises experienced around the world during the late 1980s and 1990s prompted both national and international policy making bodies to realize the importance of a sound financial system for unimpeded economic growth. In particular economies facing increasing vulnerabilities to the volatility of international capital movements required an adequate set of financial soundness indicators, to monitor their financial systems. In response to the latter, today the dissemination of financial information has emerged as a regular feature of national and international bodies responsible for financial sector surveillance. Accordingly, central banks around the globe as well as the IMF have devoted considerable resources to monitoring and assessing financial soundness in addition to publishing financial stability reports.

As a part of its surveillance, technical assistance, and policy development work, the IMF, in collaboration with the World Bank, launched the Financial Sector Assessment Program (FSAP) in May 1999. The FSAP was designed to identify financial system strengths and vulnerabilities and to help develop appropriate policy responses Sundararajan et al 2002. Initially, a broad set of measures, labelled macro prudential indicators were identified. Macro prudential indicators comprise both aggregated micro prudential indicators charged with monitoring the health of individual financial institutions, and macroeconomic variables associated with financial system soundness Evans et al 2000. The macro prudential indicators set out the broad framework for assessing and monitoring the financial health of the economy. Within this framework the IMF in co-operation with national authorities launched an initiative aimed at formulating a definition and single methodology for the construction of Financial Soundness Indicators (FSIs). To gain information on existing indicators and the need for additional indicators the IMF conducted a Survey[i] 2000 on the Use, Compilation, and Dissemination of Macro prudential Indicators.

Figure 1



In Figure 1, Slack 2003 presents a summary of the survey results. He finds that transition economies are the most eager to disseminate data on FSIs (they disseminate 74 percent of the data they collect). This is followed by the advanced economies (disseminating 65 percent of collected data), the Western Hemisphere countries (disseminating 61 percent), and Africa (60 percent). The IMF finalized and published a Compilation Guide for Financial Soundness Indicators in 2004[ii]. The methodology in the Guide was highly innovative, combining elements of macroeconomic frameworks, including monetary statistics, bank supervisory framework, and international financial accounting standards. Regards bank supervision here the Basel Committee

on Banking Supervision, provided the definitions for many of the measures on soundness or risk, such as the definition of capital adequacy, exposures to market risk, liquidity, currency exposures, earnings ratios, etc. Moreover, many of the materials were also drawn from the International Accounting Standards (IASs), with its greater focus on accrual standards, use of market or fair value accounting, and rules on impairment and provisioning.

3. Financial Soundness Indicators (Fsis)

Financial Soundness Indicators (FSIs) are aggregate measures of the current financial health of the financial institutions in a country and of their corporate and household counterparties. Broadly, FSIs are compiled and disseminated to support macroprudential analysis which involves assessment and surveillance of the strengths and vulnerabilities of financial systems with a view to limiting the likelihood of financial system failure. A seminal work by Sundararjan et al 2002 suggests these are useful to:

> "monitor the health and soundness of financial institutions and markets, and of their corporate and household counterparts. FSIs include both aggregated information on financial institutions and indicators that are representative of markets in which financial institutions operate" (Sundararjan et al 2002, p 2).

So far, the IMF has proposed thirty nine FSIs under two different sets called the *core set* and the *encouraged set*. The core set consists of twelve high-priority indicators covering the banking sector only. These indicators are widely agreed to be important and expected to be prepared by all countries. The remaining twenty seven indicators belong to the so-called encouraged set. This set of indicators is not confined to the banking sector only, but also covers non-bank financial institutions, non-financial corporations, households, financial markets and property markets. The encouraged set has not been recommended for all countries considering the fact the financial system in many countries, especially the developing ones is bank based, in addition there are limited expertise available to prepare these indicators in many developing countries. Table 1 provides the complete set of FSIs.

Table 1: Financial Soundness Indicators (Fsis)

Category	Indicators
Core Set	
Deposit taking institutions (DTIs)	
Capital Adequacy	1. Regulatory capital to risk weighted capital
	2. Regulatory tier 1 capital to risk weighted assets
	3. Non-performing loans net of provisions to capital
Asset Quality	4. Non-performing loans to total gross loans
	5. Sectoral distribution of loans to total loans
Earnings and Profitability	6. Return on assets
	7. Return on equity
	8. Interest margin to gross income
	9. Non-interest expenses to gross income
Liquidity	10. Liquid assets to total assets
	11. Liquid assets to short term liabilities
Exposure to Foreign Exchange Risk	12. Net open position in foreign exchange to capital
Encouraged Set	
DTIs	1. Capital to assets
	2. Large exposures
	(i). Total number of large exposures
	(ii). Total exposures of 5 largest DTIs to 5 largest resident entities to capital
	(iii). Total exposure of DTIs to affiliated entities and connected parties to capital
	3. Geographical distribution of loans to total loans
	4. Gross asset position in financial derivatives to capital
	5. Gross liability position in financial derivatives to capital
	6. Trading income to total income
	7. Personnel expenses to non-interest expenses
	8. Spread between reference lending and deposit rates
	9. Spread between highest and lowest inter-bank rates
	10. Customer deposits to total (non-inter-bank) loans
	11. Foreign currency-denominated loans to total loans
	12. Foreign currency-denominated liabilities to total liabilities
	13. Net open position in equities to capital
Market Liquidity	14. Average bid-ask spread in the securities market+
	15. Average daily turn-over ratio in the securities market+
Other financial corporations (non-bank financial institutions)	16. Assets to total financial system asset
	17. Asset to GDP
Non-financial corporations (Corporate Sector)	18. Total debt to equity
	19. Return on equity
	20. Earnings to interest and principal expenses
	21. Corporate net foreign exchange exposure to equity
	22. Number of applications for protection from creditors
Households	23. Household debt to GDP
	24. Household debt service and principal payments to income
Real estate markets	25. Real estate prices
	26. Residential real estate loans to total loans
	27. Commercial real estate loans to total loans

+ Or in other markets that are most relevant to bank liquidity, such as foreign exchange markets)
Source: Compilation Guide for FSIs (IMF 2006) and Sundararajan et al (2002).

The core set FSIs, focuses on five major aspects of banking institutions (or deposit takers) namely capital adequacy, asset quality, profitability, liquidity, and exposure to foreign exchange risks. Thus, the core-set is identical to the popular CAMELS [iii] methodology except the former does not include a qualitative measure e.g. (management quality) while the CAMELS method does.

4. Selected Financial Soundness Indicators

The present study considers three aspects of financial soundness namely capital adequacy, asset quality, and profitability. Each aspect is represented by at least one indicator: more specifically, we use the ratio of regulatory capital to risk-weighted assets, and the ratio of capital to assets (leverage ratio) as the indicators of capital adequacy. The ratio of non-performing loans to total loans is used to measure asset quality, while return on assets is used to measure profitability of financial institutions.

4.1. Measure Of Capital Adequacy: Regulatory Capital To Risk-Weighted Assets

The ratio of regulatory capital to risk-weighted assets measures the capital adequacy of deposit takers. The numerator of this FSI represents the sum of the regulatory capital of all individual deposit takers in a country; while the denominator is their aggregate risk-weighted assets at a certain point of time[iv]. Both regulatory capital and risk-weighted assets are defined using regulatory standards and concepts and do not correspond directly to the capital and assets as defined by the accounting profession.

There are two general approaches to defining the capital adequacy of banks[v]. These differing approaches emerge from the conflicts of interests between shareholders of banks and the regulators who actually represent the whole community of depositors. From the shareholders point of view, capital is the net worth (total equity) which equals total assets minus total liabilities. The amount of this capital (net worth) is presented in the periodic financial reports and is the orthodox accounting definition of capital. Given this definition of capital, shareholders (or their agents- bank managers) prefer to use only that amount of capital which is necessary to maximize return. In other words, bankers like to use assets that need less capital so that the return on those assets is magnified and the value of the bank's shares is increased in the market. In contrast, from the regulators perspective, this accounting definition of capital is incomplete, primarily because it does not provide full protection to the depositors. From the regulators point of view, bank capital must satisfy some conditions that ensure protection for the depositors by increasing the banks ability to absorb unexpected losses. These conditions are likely to vary across counties as they are set up at the discretion of the respective regulatory authority. For example, regulators in one country may find some restrictions more appropriate while regulators of another country may find those restrictions unnecessary. This poses a problem in comparing the capital of banks operating under different regulatory jurisdictions. In order that the central banks or supervisory authorities across the globe define a uniform set

of characteristics for bank capital, an international body called the Basel Committee on Banking Supervision[vi] at the Bank for International Settlements (BIS) drafted a resolution in 1988 know as Basel I Accord (or simply Basel I). Basel I specifies a number of characteristics for banks' capital which are summarized by Gup and Kolari 2005, p 37 as follows.

Banks' capital should:

- provide a permanent and unrestricted commitment of funds;
- be freely available to absorb losses;
- not impose any unavoidable servicing changes against earnings; and
- rank behind the claims of depositors and other creditors in the event of winding up.

Banks' regulatory capital is defined across two subcategories: tier 1 or core capital and tier 2 or supplementary capital. Tier 1 capital captures all the essential characteristics mentioned above. It measures equity holdings and is equal to the sum of tangible equity, including (1) ordinary shares (issued and fully paid up shares in common stock), (2) non-cumulative perpetual preference shares, and (3) disclosed reserves created or increased by appropriations of retained earnings or other surplus. The latter include, inter alia, retained profits, share premiums, general reserves, and legal reserves (IMF 2006: paragraph 4.70).

On the other hand, tier 2 capital consists of (1) undisclosed reserves — part of accumulated retained earnings that banks in some countries may be permitted to maintain as an undisclosed reserve; (2) asset revaluation reserves with regard to fixed assets, and with regard to long-term holdings of equities valued in the balance sheet at historic cost but for which there are latent revaluation gains; (3) general provisions or general loan loss reserves (up to 1.25 percent of risk-adjusted assets); (4) hybrid instruments that combine the characteristics of debt and equity and are available to meet losses; and (5) unsecured subordinated debt with a minimum original fixed term of maturity of more than five years and limited-life redeemable preference shares. Tier 2 capital and subordinated debt cannot exceed 100 percent and 50 percent, respectively of Tier 1 capital (IMF 2006: paragraph 4.71). Both subcategories of capital are allowed some deductions. For instance items such as goodwill, capitalized expenses, and other intangible assets are deducted from the tier 1 capital. On the other hand items such as holdings of other banks' capital instruments for example are deducted from the tire 2 capital. Table 2 presents a list of the major items of regulatory capital. Given this definition of regulatory capital (that is, the sum of tire 1 capital and tier 2 capital), Basel I requires banks to hold capital qualifying for regulatory purposes as equal or in excess of 8% of the bank's risk weighted assets. Thus, Basel I determines the minimum capital level for banks in terms of the capital's ability to cover assets which are subject to risk.

4.2. Risk-weighted Assets

Under Basel I, assets in the balance sheet of a bank are classified according to their riskiness. Different weights are applied to different risk categories so

that the value of the assets belonging to a higher risk class is reduced for the purpose of determining the minimum capital requirement. For instance a zero weight is applied to the balance sheet items such as notes, coins, gold bullion, and claims on the central banks. That is, these assets qualify in full for the definition of minimum capital requirement, whereas claims on publicly traded enterprises which have corporate status do not qualify. That is, a weight of 100% is applied to these items. In other word, regulators consider these assets to be 100 percent risky so they are excluded from the asset portfolio of banks in order to calculate the risk weighted assets.

Risk weights are also applied to off-balance sheet items. Through the use of credit conversion factors, the credit risk of off-balance-sheet items, such as credit line commitments and letters of credit that serve as financial guarantees, is also taken into account in determining regulatory capital requirements. The Basel Committee on Banking Supervision has suggested a new methodology for risk calculation which comes into effect under Basel II Accord. But the new methodology Gup and Kolari, 2005 was not adopted by most countries until 2008. The present study employs data up to the year 2007 so we do not elaborate on the new risk weighting scheme here.

TABLE 2: CATEGORIES OF REGULATORY CAPITAL
Basel I Accord

Tier 1 Capital (Core Capital)	Tier 2 Capital (Supplementary Capital)
A. Fundamental tier 1 capital:	I. Upper tier 2 capital
1. Ordinary shareholder's equity	1. General reserves for credit losses
2. Retained earnings	2. Asset revaluation reserves
	3. Perpetual cumulative preference shares approved by the regulatory authority
B. Residual tier 1 capital	4. Perpetual mandatory convertible notes and similar hybrid capital instruments approved by the regulatory authority
1. Qualifying non-cumulative irredeemable preference shares	5. Perpetual cumulative subordinated debt approved by the regulatory authority
2. Innovative capital instruments approved by the regulatory authority.	6. Pre-tax revaluation reserves
	7. Qualifying post acquisition reserves of associates
C. Less deductions for-	
1. Goodwill,	II. Lower tier 2 capital
2. Capitalized expenses and other intangible assets	1. Term subordinated debt
3. Future income tax benefit	2. Limited life redeemable preference shares and similar limited capital instruments approved by the regulatory authority.
4. Holding of own tier 1 capital instruments	
5. Equity in associated lenders mortgage insurers	III. Deductions
6. Equity investments in non-financial non-subsidiaries in excess of limits specified by the regulatory authority.	1. Holdings of, and unused trading limits for, own tier 2 capital instruments
7. Other items specified by the regulatory authority.	2. Holdings of other banks' capital instruments
	3. Other deductions required such as for capital invested of guarantees provided to entities involved in securitization activities.
	4. Any non-repayable loans advanced by the bank under the regulatory authority's certified industry support arrangements.
Tier 1 capital = (A + B) – C.	Tier 2 capital = (I + II) – III.

Source: Gup and Kolari 2005, pp 378-79 and
IMF 2006: para 4.71 - 4.73.

4.3. Measure of Capital Adequacy: Capital to Assets

The ratio of capital to assets provides an indication of the banks' financial leverage—that is, the extent to which banks' assets are financed by sources other than the banks' own capital. The leverage ratio is another measure of capital adequacy of the deposit-taking sector. The FSI is calculated by taking capital and reserves as the numerator, in addition to, for cross-border consolidated data, Tier 1 capital. In the absence of Tier 1 data, funds

contributed by owners and retained earnings (including those earnings appropriated to reserves) could be used. As for the denominator, total assets are all non-financial and financial assets.

4.3.1. Non-Financial Assets

By definition, non-financial assets provide benefits to their owners but do not represent claims on other units. Most non-financial assets provide benefits either through their use in the production of goods and services or in the form of property income. Non-financial assets can come into existence as outputs from a production process (for example, machinery), be naturally occurring (for example, land), or be constructs of society (for example, patented entities). Fixed assets, inventories, and valuables are all forms of produced assets, while examples of non-produced *assets* include land and patented entities MF 2006: para 4.37 & 4.106.

4.3.2. Financial Assets

On the other hand, *financial assets* are those financial claims over which ownership rights are enforced, from which economic benefits may be derived by their owners, and that are a store of value. Financial claims arise out of contractual relationships between pairs of institutional units, and often such claims entitle the owner (that is, the creditor) to receive one or more payments (such as interest payments) from the institutional unit on which the owner has the claim (the debtor). In addition, some financial assets generate holdings gains (and losses) for their owners. When a financial claim is created, a liability of equal value is simultaneously incurred by the debtor as the counterpart to the financial asset.

4.4. Measure of Asset Quality: Non-Performing Loans (NPL) to Total Gross Loans

This FSI is intended to identify problems with asset quality in the loan portfolio. An increasing ratio may signal deterioration in the quality of the credit portfolio, although this is typically a backward-looking indicator in that NPL are identified when problems emerge. This FSI is calculated by taking the value of NPL as the numerator and the total value of the loan portfolio (including NPL, and before the deduction of specific loan loss provisions[vii]) as the denominator IMF 2006: para 6.54 & 6.55.

4.4.1. Loans

Loans include those financial assets created through the direct lending of funds by a creditor to a debtor through an arrangement in which the lender either receives no security evidencing the transactions or receives a nonnegotiable document or instrument. Collateral, in the form of either a financial asset (such as a security) or non-financial asset (such as land or a building), may be provided under a loan transaction, though it is not an essential feature. Loans include commercial loans, instalment loans, hire-

purchase credit, loans to finance trade credit and advances, financial leases, repurchase agreements[viii] not classified as a deposit, and overdrafts (IMF para 4.45).

4.4.2. Non-Performing Loans

The FSI compilation guide recommends that loans should be classified as *NPL* when (1) payments of principal and interest are past due by three months (90 days) or more, or (2) interest payments equal to three months (90 days) interest or more have been capitalized (reinvested into the principal amount), refinanced, or rolled over (that is, payment has been delayed by agreement). In addition, NPLs should also include those loans with payments less than 90 days past due that are recognized as nonperforming under national supervisory guidance—that is, evidence exists to classify a loan as nonperforming even in the absence of a 90-day past due payment, such as when the debtor files for bankruptcy. The amount of loans (and other assets) recorded as nonperforming should be the gross value of the loan as recorded on the balance sheet, not just the amount that is overdue IMF 2006: para 4.84.

4.5.1. Measure of Profitability: Return on Assets (ROA)

This FSI is intended to measure deposit takers' efficiency in using their assets. The return on assets is calculated by dividing net income by the average value of total assets (the sum of financial and non-financial assets). This ratio involves both stock (the denominator) and flow (the numerator) variables. The stock variable is measured at a point of time—the balance sheet date, while other variable—net income, is measured for a period of time. As a result, the ratio does not truly represent profitability over a period of time if both numerator and the denominator have the same time dimension. To resolve the problem, the FSIs compilation guide has suggested to take the average of the beginning- and end-period positions (for example, at the beginning and at the end of the month) of assets.

The preferred definition of net income is net income before extraordinary items and taxes. For deposit takers, the main sources of income are interest income and non-interest income. Interest income is the difference between interest received and paid on various debt instruments. Non-interest income is all other income received by the deposit taker. It includes fees and commissions from the provision of services, gains and losses on financial instruments, and other income IMF 2006 para 6.51 (xiii) & 4.17.

4.5.2. Measure of Profitability: Return on Equity (ROE)

Return on equity is calculated by dividing net income (gross income less gross expenses) by the average value of capital over the same period. As in the case of ROA, at a minimum, the denominator can be calculated by taking the average of the beginning- and end-period positions (for example, at the beginning and the end of the month), but compilers are encouraged to use the most frequent observations available to calculate the average. The definition of income is the same as defined in case of ROA IMF 2006: para 6.25.

This FSI is intended to measure deposit takers' efficiency in using their capital. Over time it can also provide information on the sustainability of deposit takers' capital position. The ratio needs to be interpreted in combination with FSI's on capital adequacy, because a high ratio could indicate high profitability and/or low capitalization, and a low ratio could indicate low profitability and/or high capitalization.

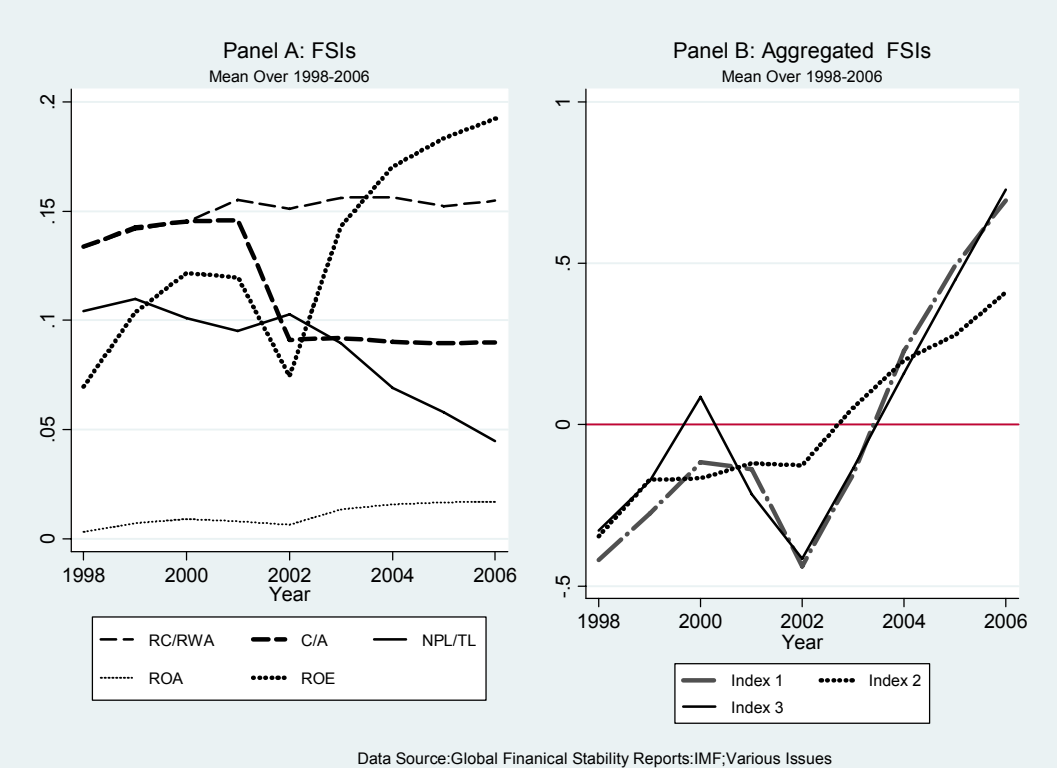
4.6. FSI's over Time and across Countries

The objective of the financial soundness indicators (FSIs) is to provide users with an idea of the health of the financial sectors across the globe. The IMF started working on a globally comparable database of FSIs through the Financial Sector Assessment Program (FSAP) in 1999. Since then it has been encouraging its member countries to prepare and disseminate data on a set of indicators that can be used for monitoring global financial health. In response to this initiative, the member countries have been providing FSIs data and the IMF has been publishing them in its Global Financial Stability Reports (GFSR). The following paragraphs illustrate the published FSIs over the period 1998 to 2006 and across certain groups of countries.

4.6.1. FSIs 1998-2006

Panel A of the figure 2 shows the average individual core set indicators (covering the banking sector) for our whole sample; (list of countries are provided in appendix 2) namely regulatory capital to risk-weighted assets (RC/RWA- the medium thick dash line), capital to assets (C/A- the thick dash line), non-performing loans to total loans (NPL/TL- the solid line), return on equity (ROE-the thick dot line), and return of assets (ROA-the very thin dot line at the bottom of the panel). The figure shows an increasing trend in the regulatory capital (RC/RWA). A possible explanation is that banks were taking more precautions against the possible down-turn of the economy. On the other hand, regulators were more watchful of the developments in banking sectors after the financial crisis in 1997. Banks might have to maintain more restraint in regard to valuation of assets which are subject to risk. This resulted in a fall in the denominator of the capital adequacy ratio.

Figure 2



Notes: RC/RWA: Regulatory Capital to Risk Weighted Assets. C/A: Capital to Assets. NPL/TL: Non-performing Loans to Total Loans. ROA: Return on Assets. ROE: Return on Equity. The indexes are computed using the following formula where FSIs represent their normalized values:

$$\text{Index } 1 = 0.1 \times \text{RC/RWA} + 0.1 \times \text{C/A} + 0.25 \times \text{ROA} + 0.05 \times \text{ROE} - 0.5 \times \text{NPL/TL}$$

$$\text{Index } 2 = \text{Sc} \times 0.5(\text{RC/RWA} - \text{NPL/TL}) \; ; \; \text{Index } 3 = \text{Sa} \times 0.5(\text{ROA} + \text{ROE}).$$ Where *Sc* is the ratio of banks' credit to GDP, *Sa* is the ratio of banks' assets to GDP.

The leverage ratio, that is, the ratio of capital to assets (C/A) had a sharp fall in 2002, which may be due to the change in methodology in calculating this ratio. Moreover, it needs to be pointed out that the average for this ratio is taken for 96 countries while that for the RC/RWA is taken over 105 countries (a summary of the data is provided in appendix 2). Furthermore, there are missing observations for many countries especially before 2002. Apart from the dramatic change in 2002, on average this indicator has been steady over the last five years. Leverage magnifies the variability of operating profit. A steadily changing ratio of capital to assets thus, implies moderate attitude of bankers toward risk.

Among the other aspects of the global financial health, the ratio of non-performing loans to total loans (NPL/TL) shows a falling trend on average. This gives an explanation why regulators have been applying more constraints as reflected by the increasing ratio of regulatory capital to risk weighted assets. The intensity of non-performing loans is more profound among low income countries which we can see in figure 3.

Among the profitability ratios, the return on equity (ROE) appears to be the most volatile indicator compared to others. As described earlier this ratio

needs to be interpreted in combination with FSIs on capital adequacy, because a high ratio here could indicate high profitability and/or low capitalization, and a low ratio could indicate low profitability and/or high capitalization. Moreover, it has to be used with the other profitability ratios i.e. return on assets (ROA). We can see that ROE falls dramatically in parallel with the ratio of capital to assets in 2002 but both indicators show a consistent pattern thereafter. The ROE averaged across counties has been increasing in a regular fashion while the ratio of capital to assets (C/A) remains virtually unchanged. The other profitability ratio- ROA has been growing at moderate rate 1998.

We can see in figure 2 that there has been a considerable degree of variability in capital to assets and the return on equity before 2002. Actually, data before 2002 are not that reliable as they are after this year. The reason is pretty clear. There was no globally acceptable guideline for compiling FSIs. The IMF member countries prepared and disseminated these indicators out of their own discretion. An initial version of the compilation guide was released by the IMF for discussion in 2002. This might have an impact on the FSIs data since 2002 especially on the capital to asset ratio and the return on equity. Because of these apparent irregularities we use data for five years from 2002 to 2006 in some most of the following illustrations. Although there are still methodological differences across countries, we can say however, that individual FSIs give us a partial view of global financial health overtime. But for a plausible assessment of the overall soundness of financial systems, we need a measure that considers all the aspect together. But we cannot add individual ratios straight away as each ratio has a different meaning and implication to the soundness of financial system. For example, while ROA represents a positive implication, the ratio of non-performing loan poses a threat to the financial system. Thus, the sum of ratios would give a misleading assessment about the overall health of the financial system. Considering these opposing implications, some authors have suggested weighted average with different weights for different FSIs as the measure of overall financial health.

Below we prepare an index following Geršl and Heřmănek 2007. This index (referred to as the Index 1) is a weighted average of the normalized values of individual core set FSIs (indicators for banking sector). Before aggregation the individual FSIs are normalized in order to achieve the same variance. Thus the Index 1 is defined as[ix]:

$$\text{Index } 1 = 0.1\times(\text{RC/RWA}) + 0.1\times(\text{C/A}) + 0.25\times(\text{ROA}) + 0.05\times(\text{ROE}) - 0.5\times(\text{NPL/TL}) \quad (1)$$

The weights of the partial indicators were set by expert judgment and do not take into account the potential correlation between individual partial indicators. The highest (negative) weight is assign to non-performing loans because it indicates a threat to banks financial health. The lowest weight is assigned to return on equity because a higher return on equity does not necessarily guarantee safeguarding the depositors' interest. But a higher rate is assigned to return on assets because it indicates banks' efficiency in allocating fund to

productive investments. The indicators of capital adequacy are given the second highest weight (20% taking the individual weights for the two indicators together) considering the importance of capital for banks.

Two other indexes are constructed following Das et al 2003. Both of these indices are equally weighted average of the normalized individual FSIs but the average values of the index rather than the individual FSIs are weighted by the size of the banking sector. Equations 2 and 3 define the other two indexes.

$$\text{Index 2} = Sc \times 0.5[(RC/RWA) - (NPL/TL)] \quad (2)$$

$$\text{Index 3} = Sa \times 0.5(ROA+ROE) \quad (3)$$

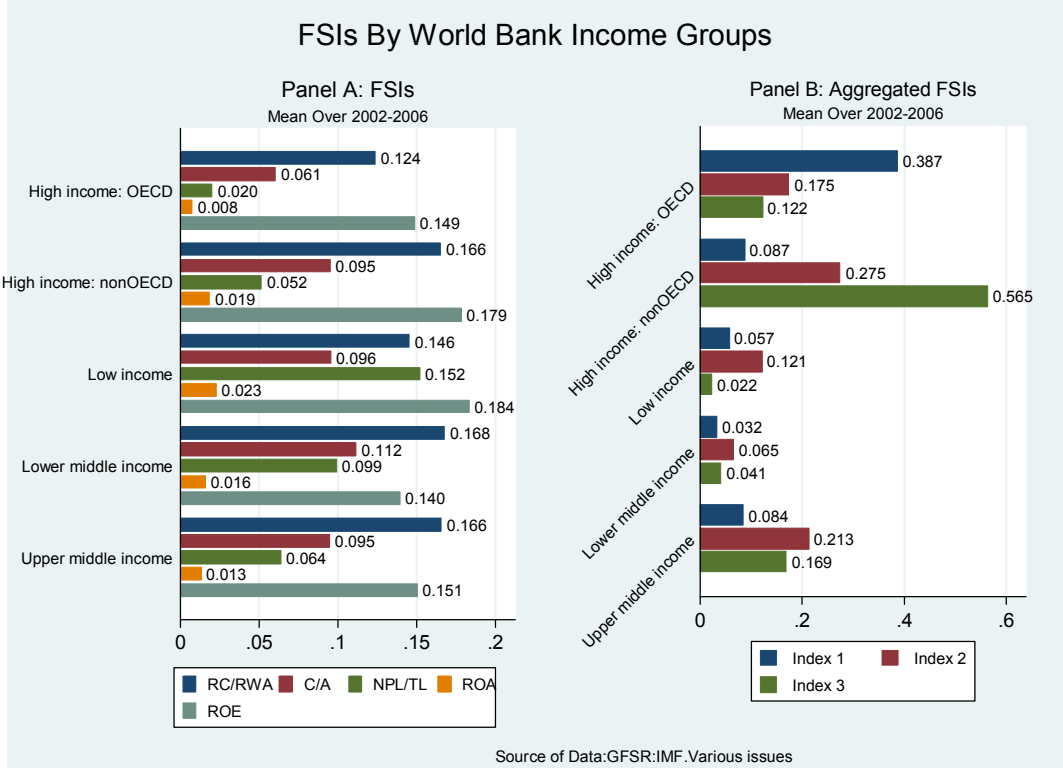
Sc index two and *Sa* in index 3 are the indicators of the size of banking sector. *Sc* is measured by the ratio of private credit by banking sector to GDP while *Sa* is measured by the ratio of deposit takers assets to GDP.

Panel B of figure 2 illustrate the mean value of these three indexes over the period 1998 through 2006. As these indices are the weighted averages of normalized values of individual FSIs, an increase in the value of an index means an improvement and a decrease means deterioration in the overall financial stability. In other words, a positive value means that an indicator is above its historical average calculated over the period 1998−2006 and a negative value means it is below its historical average. Thus, on average, the aggregated indexes are showing a recovery trend of global financial system since the financial crisis of the late 90s. Now we will see the trend across different groups of countries.

4.7. FSI's - Country Groups

There are considerable differences in financial system soundness across various country groups. Figure 3 shows FSIs for the last five years 2002 - 2006 across various groups of countries classified by the World Bank according to their per capita GNI in 2006[x]. In the figure it is difficult to differentiate these countries in terms of individual FSIs, there are however, discernable differences in terms of the aggregated indexes.

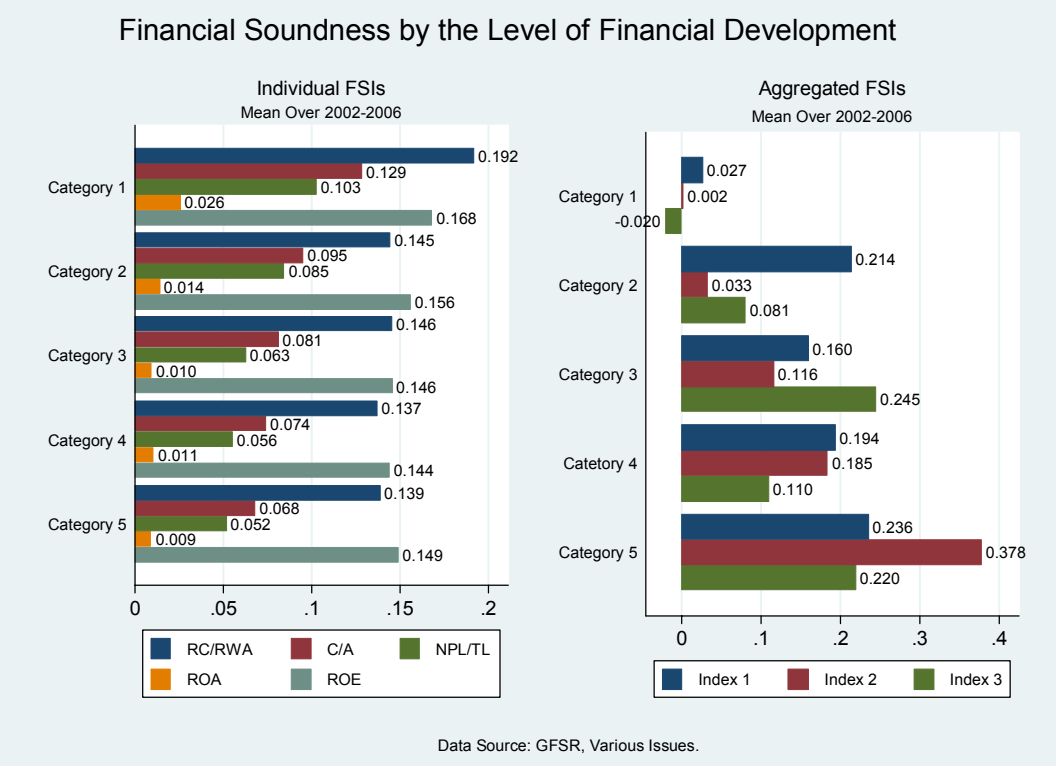
Figure 3



We can see almost similar values for some of the FSIs such as RC/RWA and ROE across different income groups. But there is a big difference among these countries in terms of NPL/TL that measures the asset quality. As the higher the NPL/TL the lower is the asset quality, the low and middle income countries appear to have been struggling with bad quality loans during the last five years. Because this ratio is assigned a negative weight of 0.5 in the index 1, low income countries registered lower values for this index. The ROE across the country groups is puzzling, however an explanation for the high ROE in the low income countries might be their lower capitalization rate; or this might be an indication that the banking sector in these countries is a lucrative area for equity investment. But such promise turns bleak when the ROE is combined with the ROA. Index 3 is a weighted average of these two profitability ratios. As we can see in panel B of figure 3, the high income non-OECD countries have performed the best in term of overall profitability during the last five years. In all, the high come counties have registered the maximum improvements in every aspect of the soundness of financial system.

Figure 4 indicates that the overall financial system soundness also varies across countries categorized by their level of financial development. Financial development is measured by the ratio of M3 to GDP. The whole sample is divided according to this ratio into five quintile groups. Thus, the category 5 represents twenty percent of the sample whose mean value of the level of financial development (M3/GDP) over 2002 to 2006 has been the highest compared to the other countries in the sample. Likewise, the category 1 represents 20 percent of the sample with the lowest level of financial

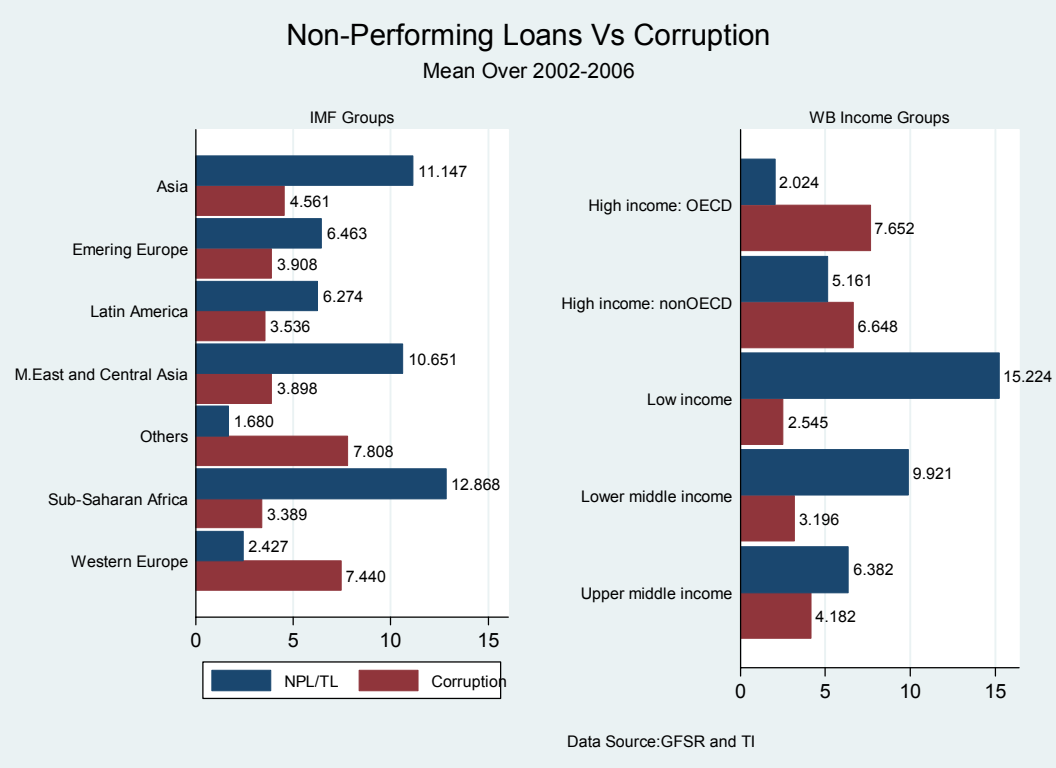
Figure 4



Notes: Financial development is measured by the ratio of M3 to GDP. Countries in the sample are divided in five quintile groups according to the average value of this ratio over period 2002-2006. Thus, category 1 represents lowest 20 percent of the sample according to the level of financial development. Likewise, category 5 represents those 20 of the sample whose financial development have been the highest compared to the other countries in the sample.

development over the same period. Again we can see in figure 4 that these country groups may not be distinguished in terms of individual FSIs as some of the FSIs have almost the same value across different groups. But considerable differences can be detected in term each of the indexes defined earlier. For instance, countries with the highest level of financial development (category 5) appear to have the highest value for index 2. This reason is that this index is a weighted average of capital adequacy and non-performing loans where the latter is assigned a negative weight. Because these countries have the lowest level of non-performing loans compared to other countries in the sample, the value of this index has been the highest for these countries. The higher level of non-performing loans in these countries makes the point more candid and clear that these countries have been suffering from poor asset quality during the last five years.

Figure 5



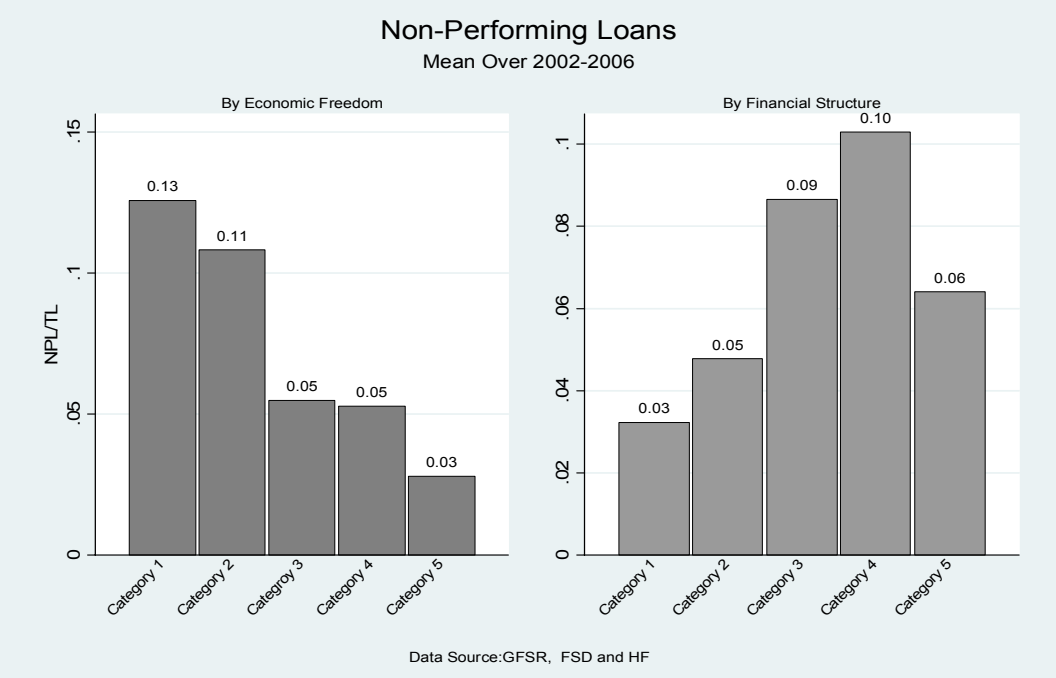
Notes: Corruption represents the Corruption Perception Index prepared by the Transparency International (TI). The TI's corruption index measures corruption on a 0 to 10 scale with higher value means lower level of corruption. The construction methodology is available at: http://www.transparency.org/policy_research/surveys_indices/cpi

The high intensity of non–performing loans in the low income countries appears to be an outcome of poor public level governance and institutional quality. Figure 5 illustrates non-performing loans (in percentage) and the level of corruption across various regional and income groups. The figure reveals a negative relationship between corruption and non-performing loans. We use the *Corruption Perceptions Index* prepared by the Transparency International (TI) as a proxy for corruption. The corruption perceptions index ranks 180 countries by their perceived levels of corruption, as determined by expert assessments and opinion surveys. The index is defined on a 0 to 10 scale with a higher (low) value means low (high) level of corruption. The figure 5 shows that the group of countries with a higher value of corruption i.e. the mean for the corruption perception index over the period 2002-2006 has a lower level of non-performing loans. For instance, the high income OECD countries have an average corruption index of 7.65 during 2002-2006 but their average non-performing loans during the same period has be the lowest (about 2 percent) compared to the other groups. Whereas, the corruption index for the low income countries have been 2.5 and their average non-performing loans have been about 15 percent. The data clearly indicates that the trouble of non-performing loans is more frequent in the economically poor regions of the world.

We also considered another measure of institutional quality referred to as the *index of economic freedom*. This index is prepared by the Heritage Foundation[xi]. The index perceives economic freedom as a state of social life that 'encompasses all liberties and rights of production, distribution, or consumption of goods and services' Beach and Kane 2007. Overall economic freedom constitutes ten measures of rights and liberties namely business freedom, trade freedom, monetary freedom, freedom from government, fiscal freedom, property rights, financial freedom, freedom from corruption, labor freedom, and equal rights[xii]. Each of these components is graded using a scale from 0 to 100, where 100 represent the maximum freedom. The index of overall economic freedom is an equally weighted average of these components. A score of 100 signifies an economic environment or set of policies that is most conducive to economic freedom. By this definition, the highest form of economic freedom provides an absolute right of property ownership, fully realized freedoms of movement for labor, capital, and goods, and an absolute absence of coercion or constraint of economic liberty beyond the extent necessary for citizens to protect and maintain liberty itself.

As we did in regard to the level of financial development, here again the whole sample is divided into five quintile groups according to the mean values of the index of economic freedom over the period 2002-2006. Thus, the category 1 comprises 20 percent of the sample with the lowest value of economic freedom; while the category 5 includes another 20 percent of the sample with the highest value of economic freedom. We can see differing levels of non-performing loans in various groups of counties classified according to the level of economic freedom. The left panel of figure 3.6 depicts the fact. We can observe a negative relationship between asset quality of banking sector and the level of economic freedom as countries with the highest level of economic freedom appear to have the lowest level of non-performing loans. This implies that poor institutional quality is potential threat to the soundness of financial systems.

Figure 6



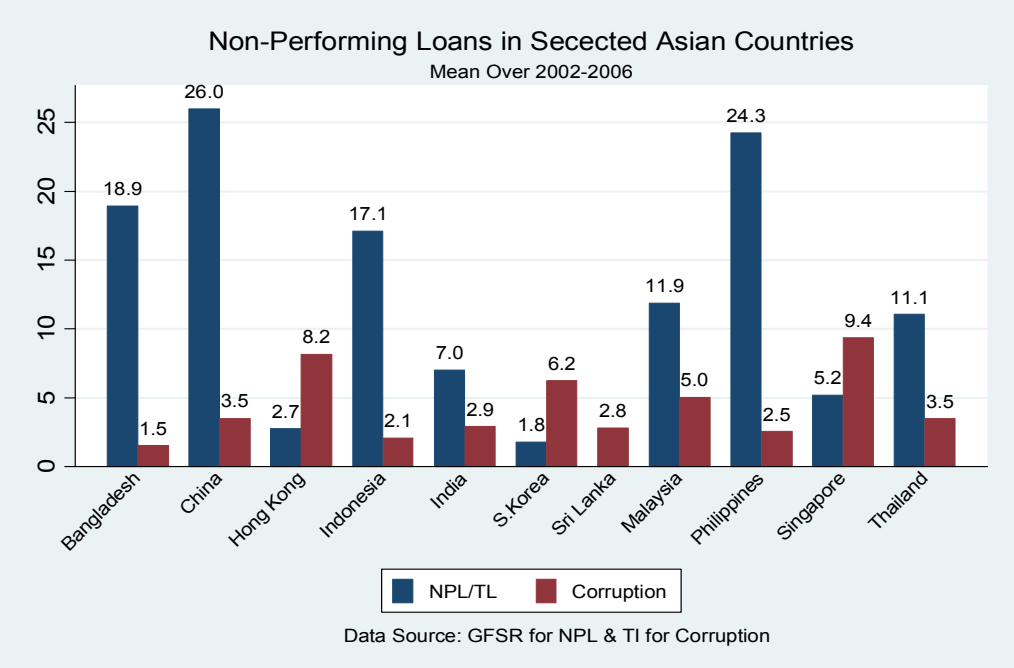
Notes: Economic freedom is measured on a scale of 0 to 100, with a higher (lower) value means more (less) economic freedom. Thus category 1 in the left panel are the countries with lowest level of economic freedom, and category 5 includes countries with the highest level of economic freedom. Economic freedom data are taken from the Index of Economic Freedom 2008 constructed by the Heritage Foundation (HF). The index is available at: http://www.heritage.org/research/features/index/index.cfm. The right panel shows countries classified by the indicator of financial structure. The indicator is defined in the text (eq. 3.4). Category 1 represents the group of more market-based countries; whereas category 5 is the group of more bank-based countries. The data source for this indicator is Financial Structure Dataset (FSD) introduced in chapter 2.

The right panel of figure 6 shows non-performing loans across counties classified by an indicator that measures the structure of financial system. The indicator is defined as:

$$\text{Financial structure} = \frac{\text{Average of M3/GDP over 2002-2006}}{\text{Average of Stock Market Liquidity over 2002-2006}} \qquad (4)$$

A higher value of this indicator implies the financial system is more bank-based; whereas a lower value means the financial system is more market-based. As we can see in the right panel of figure 6, differentiating asset quality among countries with differing financial structure is not as easy as among countries with differing institutional quality.

Figure 7



Notes: For description of corruption index, please refer to the notes beneath figure 3.5. NPL for Sri Lank is not available.

This alludes to the fact that structure of the financial system is not as important as the institutional quality to explain the difference of asset quality across countries. The fact becomes more evident if you look at some Asian countries. We can see in figure 7 that countries with poor public level governance (a lower value of the corruption index) have poor asset quality (high value of NPL/TL).

4.8. Conclusion

This paper introduces a new set of economic data called financial soundness indicators (FSIs). We have found that the set of FSIs published so far allow some comparative analysis of financial health across countries, despite some methodological differences and slight discrepancies due to national limitations as regards data collection. FSIs data are compiled and disseminated by the central banks and regulatory authorities across the world and the IMF publishes them in one of its quarterly publication called Global Financial Stability Report (GFSR). As the central banks apply considerable discretion in compilation and dissemination of FSIs, and there was no globally acceptable guideline at the initial stage of the emergence of this dataset, one may suspect the reliability of the FSIs especially those of the initial stage. In an attempt to impose universal standards on these FSIs the IMF released a preliminary version of a compilation guide for FSIs in 2002. This may have an impact on the compilation of FSIs across countries as data after this year appear to be more consistent and credible. Considering the anomalies in the

data before 2002, we considered data after this year in most of our analyses. Although there are still methodological differences, we have found the FSIs are reliable and consistent especially in illustrating asset quality across various groups of countries. We have also observed that an aggregate financial soundness indicator may serve as a first step towards better operationalizing the concept of financial soundness and building a more appropriate framework for assessing and comparing financial stability across countries.

Endnotes

[i] The survey asked member countries about the types of indicators they needed, the availability of the data, and the standards they used for compiling the data. There was a very strong response from over 100 countries that allowed the IMF to identify a core set of financial soundness indicators that all countries should compile and a second strand of important indicators that countries might choose to compile depending on national circumstances.

[ii] The *Guide* was released in electronic format in 2004 and issued as an official IMF publication in 2006. The guide, referred to as IMF (2006) in this study, is available at: http://www.imf.org/external/pubs/ft/fsi/guide/2006/index.htm

[iii] 'CAMELS' is a popular bank-rating system where banks are rated by supervisory authorities on six factors namely capital adequacy (C), asset quality (A), management quality (M), earnings (E), liquidity (L) and sensitivity to market risk (S). These six factors are represented by the acronym 'CAMELS'.

[iv] The concept of regulatory capital is described in paragraphs 4.68 to 4.73 and 4.75, and that of risk-weighted assets in paragraph 4.74 of the FSIs compilation guide (IMF (2006).

[v] Gup and Kolari (2005, chapter 12) provides an introductory description of different approaches to defining bank capital.

[vi] The Basel Committee on Banking Supervision provides a forum for regular cooperation on banking supervisory matters. Its objective is to enhance understanding of key supervisory issues and improve the quality of banking supervision worldwide. The Committee's members come from Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom and the United States. Countries are represented by their central bank and also by the authority with formal responsibility for the prudential supervision of banking business where this is not the central bank. More details can be found at: http://www.bis.org/bcbs

[vii] Specific loan provisions are the outstanding amount of provisions made against the value of individual loans, collectively assessed groups of loans, and loans to other deposit takers IMF 2006: para 4.50).

[viii] A securities repurchase agreement is an arrangement involving the sale for cash of securities at a specified price with a commitment to repurchase the same or similar securities at a fixed price either on a specified future date (often a few days later) or with an open maturity IMF 2006: para 4.48.

[ix] FSIs when normalized follow a normal distribution with a zero mean and unit standard deviation. The normalization formula is $(x_{i,t} - \overline{x}) / \sigma_i$ where $x_{i,t}$ is the individual FSI of country *i* at time *t*, $\overline{x}$ is its mean, and σ_i is its standard deviation over the sample period.

[x] The World Bank classifies all World Bank member economies and all other economies with populations of more than 30,000. For operational and analytical purposes, economies are divided among income groups according to 2006 gross national income (GNI) per capita, calculated using the World Bank Atlas method. The groups are: low income, $905 or less; lower middle income, $906–$3,595; upper middle income, $3,596–$11,115; and high income, $11,116 or more (WB 2007).

[xi] The latest updates of the index and other information can be found at: http://www.heritage.org/research/features/index/index.cfm

[xii] A detailed discussion of these components is provided in the appendix.

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