Banking System Resilience and Financial Stability

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Abstract

This paper while emphasising the importance of the concept of financial stability in the wake of recent global financial crisis attempts to highlight the significance of the soundness of banking sector in emerging economies where banking sector constitutes a lion's share in the financial system. Attempt is made to define financial stability in backdrop of the ongoing definition debate for financial stability. Another contribution of this study is that, employing the appropriate key determinants of banking sector soundness, the paper models a basic axiomatic form of banking stability index (BSI) in the context of an emerging economy banking sector.

Keywords: Financial stability; Instability; Banks and financial institutions, Indicator, Crisis

JEL classification codes: E44; E58; G1, G21, G28

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1. INTRODUCTION

En route, the robust growth in financial markets and recurrent occurrences of financial distress during the past two decades, financial stability has turn out to be an increasingly important objective in economic policymaking and has attracted renewed focus, mainly because of the dynamism of financial liberalisation and globalisation. Financial liberalisation has led to the emergence of financial conglomerates, which cut across not only various financial sectors such as banking and insurance, but also a number of countries and have led to massive cross-border capital flows. Such such flows are often intermediated to speculative activities such as real estate and stock markets during periods of excessive capital inflows leading to asset price bubbles posing serious risks to the balance sheets of financial institutions as well as non-financial corporations. Moreover, volatility in capital flows is manifested in sharp movements in exchange rates causing an adverse impact upon the balance sheets of residents because of large devaluations. Large devaluations can cause serious currency mismatches (for e.g. Asian financial crisis) resulting in large costs in terms of output and employment losses. In view of this reasoning, maintenance of financial stability has emerged as a key objective especially in the case of emerging economies as they are frequently forced to borrow in foreign currencies. Absolutely, financial stability and macroeconomic stability are intricately related. Financial stability can be vulnerable even if there is price stability and macroeconomic stability and hence cannot be taken for granted. Moreover, it is also observed that a threat to financial stability anywhere in the world is potentially a threat to financial stability everywhere. In view of that, financial stability has to shift from being an implicit variable to an explicit variable of economic policy.

This paper attempts to find some ripostes for some of the related issues of deliberation such as; does financial stability require the soundness of institutions, the stability of markets, the absence of turbulence and low volatility? and to what extent the soundness of banking sector in the case of emerging economies can help financial system. This paper is one among the evolving body of literature that underscores the significant relationship between banking system resilience financial instability. The endeavour in this study is to analyse and understand the concept and definition of financial stability and in that backdrop analyse the

banking system resilience in the case of emerging market economy like that of India. An assessment of financial stability can be profound with quantitative references to critical conditions at which the financial system would not function healthily. This paper begins by presenting in Section 2, the theoretical framework illustrating the recent approaches on defining and analysing financial stability placing the banking system at the epicentre of analysis. This study analyses more specifically how banking system resilience can augment financial stability in emerging market economies like that of India that successfully came out of the recent global financial crisis. The methodology involving the data and its sources and research design explaining the empirical framework and estimation of banking stability index is expounded in Section 3. The results of the analyses with discussion on the findings are enunciated in Section 4 and the conclusion and policy implications are offered in Section 5.

2. FINANCIAL STABILITY – THEORETICAL FRAMEWORK

2.1 Financial Stability – The Definition Debate

While monetary stability is commonly referred to stability of price level, price stability is often thought of as an environment where inflation does not materially affect the economic decisions. Price stability does not refer only to individual prices, but prices of an aggregate basket of consumer of goods and services. On the contrary, financial stability is not tractable to any commonly agreed definition. Indeed financial stability is often understood in layman terms as the absence of financial instability resulting from banking crisis or even extreme financial market volatility or such related financial shocks. Moreover, unlike price stability, financial stability cannot be instantly measured, modelled, or forecast.

Notwithstanding its extensive use, financial stability is difficult to define let alone measure. A sound understanding of financial stability necessitates a conceptual framework (Houben et al, 2004). In understanding financial stability, the first limitation has been yet there is no widely accepted model or analytical framework for assessing the financial stability as this it is still in its infant stage of development and practice, as compared with—for example—the analysis of monetary and/or macroeconomic stability (Garry J. Schinasi, 2004). The concept of financial stability is nebulous with no commonly accepted definition. However, there have been some attempts to define financial stability. Aerdt Houben et al., (2004) considering financial stability as a continuum changeable overtime and consistent with multiple combinations of its constituent elements, define it as the ability to help the

economic system allocate resources, manage risks and absorb shocks. The best approach according to Allen and Wood (2006) is to define the characteristics of an episode of financial instability first and then define financial stability as a state of affairs in which episodes of instability are unlikely to occur. Davis (2003) identifies three generic types of financial instability. The first is centered on *bank failures*, typically following loan or trading losses, the second involves extreme *market price volatility* after a shift in expectations and the third being the one that is linked to the second, involves protracted collapses of market liquidity and issuance.

Garry J. Schinasi (2004) lists the key principles for defining financial stability as; (i) financial stability is a generic concept, embodying the varied aspects of the financial system. (ii) Financial stability should not only imply that financial system should fulfill its role of efficient allocation of resources and risks, mobilizing savings, and facilitating wealth accumulation, development, and growth but it should also entail that the systems of payment throughout the economy function smoothly. (iii) Financial stability relates not only to the absence of financial distress but also to the capability of the financial system to limit, contain, and deal with such situations. (iv) Financial stability be understood in terms of the potential consequences for the real economy, and (v) financial stability be thought of as befalling along a continuum. Borio, (2003) and others take a macro prudential viewpoint and state financial stability in terms of limiting risks of significant real output losses associated with episodes of financial system-wide distress.

Mishkin (1994) suggesting a more information-based definition states that financial instability occurs when shocks to the financial system interfere with information flows so that the financial system can no longer do its job of channeling funds to those with productive investment opportunities. On the other hand, Crockett (1997) proposes that financial stability refers to the stability of key institutions and markets that go to make up the financial system. Further, Issing (2003) and Foot (2003) have suggested that financial stability is associated with financial market bubbles, or more generally, with volatility in financial market proxies as these bubbles impair financial markets efficiency; however, in and of themselves, they do not constitute a defining characteristic of financial fragility, and more generally financial instability. Suggesting institutionally oriented definitions, Haldane *et al* (2004), among others, have proposed that financial instability could be defined as any deviation from the optimal saving-investment plan of the economy that is due to financial imperfections in the

financial sector. Similarly, Goodhart *et al* (2004, 2005, 2006 a, b) and Tsomocos (2003 a, b) offer definitions for financial stability that hinges upon the welfare effects on the economy and distributional consequences arising during periods of financial instability

To sum-up, the information-based definition of Mishkin and others and the institutionally oriented one offered by Crockett and Haldane *et al*., Schwarz, encompass essential aspects of financial stability. However, they do not capture the welfare and distributional effects, instead highlight the inefficiency and the asset price volatility that a financially unstable regime generates, and hence fail to qualify to be applied for welfare analysis. Hence, it is opined that the definition should encompass the interaction of monetary and regulatory policy, and financial instability and that can be studied in the *continuum* rather than as an extreme and discontinuous phenomenon. The definition needs to be sufficiently flexible to encompass most of the recent episodes of financial instability and can explain a systemic financial crisis of the economy that can be reinterpreted as a case of equilibrium non-existence. Accordingly, this paper takes into consideration a constructive viewpoint and defines financial stability as a state of affairs in which the financial system can; achieve efficient allocation of resources; assess and manage financial risks; absorb the emerging shocks; ensure smooth payments and remittances; enhance equilibrium by managing asset and price volatility; and lead the economy towards benefits of economic welfare.

2.2 Global Financial Crisis and Financial Stability

The recent global financial crisis, also termed as 'the great recession' which resulted into a grave banking panic and threw most of the economies of the world into severe recession, is mostly attributed to several factors such as; Increasing global imbalances, build-up of excessive leverage, mismatches in financial intermediaries, regulatory and supervisory system loopholes, complex financial products carved out of mindless financial innovations. The crisis set off unprecedented panic and uncertainty about the extent of risk in the system thereby causing sudden and massive break down of trust across the entire global financial system. While banks tended to hoard liquidity, the credit, bond and equity markets witnessed huge setback resulting in massive deleveraging that hammered down asset prices, setting off a vicious cycle. While a few of the monolithic global financial giants collapsed, quite a few of such venerable financial institutions came to the brink of collapse. Although the epicentre of the crisis was in the advanced economies particularly originating from the US, it soon proliferated from the financial sector to the real sector in advanced economies, concomitantly

stretched geographically to the emerging market economies, and rapidly engulfed the global economy. In view of the above occurrences, Post-crisis, financial stability has turned out to be the central objective for regulators across the globe. Moreover, researchers and policy makers should also review and draw lessons from the varied episodes of financial turmoil for further strengthening financial stability in their economies (Table-1).

Table-1: Some notable financial crises due to systemic risk

Year	Episode	Main feature
1974	Herstatt (Germany)	Bank failure following trading losses
1979-89	US Savings & Loan crisis	Bank failure following loan losses
1987	Stock market crash	Price volatility after shift in expectations
1990-91	Norwegian banking crisis	Bank failure following loan losses
1991-92	Finnish and Swedish banking crises	Bank failure following loan losses
1992-96	Japanese banking crisis	Bank failure following loan losses
1992-93	Exchange Rate Mechanism crises	Price volatility after shift in expectations
1995	Mexican crisis	Price volatility after shift in expectations
1997-98	Asian crises	Price volatility after shift in expectations and bank failure following loan losses
1998	Russian default and Long Term Capital Management (LTCM)	Collapse of market liquidity and issuance
2000	Argentine banking crisis	Bank runs following collapse of currency board
2000-01	Turkish banking crisis	Bank failure following loan losses
2001	Bursting of dot-com bubble	Speculations concerning internet companies crashed
2007	Northern Rock crisis in UK	Bank failure due to funding and liquidity problems
2008-10	Global Financial Crisis	Collapse of global financial institutions
2010	European sovereign debt crisis	Failure of PIIGS (Portugal, Ireland, Italy, Greece, Spain) countries in managing sovereign debts and fiscal prudence

Source: Compiled by author from various sources

The frequency of incidence of financial crisis has been the highest over the past three decades or so (table-2). Financial crises have affected both advanced as well as emerging market economies adversely in varying degrees.

Table-2: Frequency of Financial Crisis: 1973-2007

Period	Banking Crisis	Currency Crisis	Sovereign Debt Crisis	Twin Crisis	Triple Crisis	Total No. of Crises
1970s	4	26	7	–	–	37
1980s	40	74	42	11	4	171
1990s	73	92	7	27	3	202
2000s	7	19	8	4	3	41
Total	124	211	64	42	10	451

Source: Laeven and Valencia, (2008)

An assessment of the incidence of financial crises over the past one and a half century reveals that although crisis occurs without warning, the incidence can essentially be explained in terms of the prevailing macroeconomic conditions, the financial regulatory regime, currency regime, fiscal discipline and global capital and trade flows.

2.3 Global Measures for Financial Stability

Explicit pursuit of financial stability is one of the most significant lessons from the recent global financial crisis. While multilateral standard setting bodies are placing in revised norms for worldwide regulation, countries across the world are implementing new regulatory frameworks for ensuring financial stability. The Financial Stability Board (FSB), a global body established to address financial system susceptibilities and to drive the development and implementation of strong regulatory, supervisory, and other policies in the interest of financial stability is the successor to the Financial Stability Forum (FSF), which was set up by the G-7 in the wake of the Asian crisis in 1999. FSB has been set up with an expanded membership (drawn mainly from the G-20). While FSF was exclusively focused on developed financial centres, FSB is more broadly represented.

In US, the major objectives of the legislation Restoring American Financial Stability Act of 2010 are stated as "to promote the financial stability of the United States by improving accountability and transparency in the financial system, to end 'too-big-to-fail', to protect the American taxpayer by ending bailouts, and to protect consumers/investors from abusive financial services practices''. In the case of UK, The UK Financial Services Authority (FSA) is envisaging stipulation of stricter capital rules than those proposed by the Basel Committee

on Banking Supervision (BCBS), particularly for systemically key banks. In a joint initiative with Financial Reporting Council (FRC), the FSA is proposing for regulatory scrutiny of the relationship between bank auditors and banks to ensure audit independence with regard to assigning valuations, particularly to complex financial instruments. The UK Stewardship Code developed by the Financial Reporting Council (FRC) is the first of its kind setting out good practices on the engagement of institutional investors with companies.

In the Eurozone, while the European Central Bank (ECB) is in charge of monetary policy, interventions on the foreign exchange markets and international and European cooperation, there are separate mechanisms in place for monitoring and assessment of financial stability. Presently, the Committee of European Banking Supervisors (CEBS) has been tasked to provide regular bank sector analysis, perform assessments on risks and vulnerabilities on the banking sector, and report its outcomes periodically to the European Union political institutions. However, the EU has proposed the establishment of European Systemic Risk Board (ESRB) responsible for macro-prudential supervision in the EU with the important agenda being that of the "Systemically Important Financial Institutions" (SIFIs). India too has constituted an apex Financial Stability and Development Council (FSDC) for institutionalizing the mechanism for maintaining financial stability and resolving inter-regulatory disputes. The Reserve Bank Governor heads a sub- committee of the Council with the mandate to look after financial stability and inter-regulatory coordination.

2.4 Financial Stability and Banking Sector

A stable macroeconomic environment is essential for banking sector stability, mainly because uncertainty about macroeconomic policies and wavering fundamentals, such as economic growth and inflation, renders it challenging for banks to assess credit risks accurately. Subdued economic growth, due to macroeconomic uncertainty or for other reasons, may impair bank soundness as it reduces the debt servicing capacity of firms and households.

Particularly in emerging economies, at present, the banking sector is by far the most important part of the financial system in all and is, therefore, also the main source of risk for financial stability. This is all the more so because the lack of well-functioning equity markets confronts banks with relatively high credit risks, as bank credit is necessary (to some extent) to substitute for equity. In their surveillance of the financial system, central banks, targeting

financial stability, mostly employ a wide range of tools. More often, pure financial soundness indicators widely used, but of late, structural types of models that explicitly include behaviour of economic agents have been developed by central banks for understanding financial stability. In this paper

2.5 Financial Soundness

One of the important sources of vulnerability that can affect financial stability and lead to a financial crisis can be the weakness (such as a high level of short-term debt) in the financial structure of the economy i.e., the composition and the size of the assets and liabilities on the balance sheet. A financial crisis follows when the demand for financial assets of one or more sectors plummets and consequently the banking system fails to meet the outflows or may be unable to attract new financing or roll over existing short-term liabilities. In this direction, financial soundness (Table-2) matters much during the financial crisis because it gives some indication of how likely it is that financial problems would be transmitted into the real economy (by, for example) a reduction in the supply of loans.

Table-2: Core Financial Soundness Indicators of Select Countries

(In percent)

	Australia	France	UK	USA	Russia	China	India	Brazil	South Africa
Capital Adequacy Ratio [CAR]									
2005	10.2	11.3	12.8	12.9	16.0	2.5	12.8	17.9	12.3
2006	10.3	10.9	12.9	13.0	14.9	4.9	12.3	18.9	12.3
2007	10.1	10.2	12.6	12.8	15.5	8.4	12.3	18.7	12.8
2008	11.3	10.5	12.9	12.8	16.8	12.0	13.0	18.2	13.0
2009	11.9	12.4	14.8	14.3	20.9	11.4	13.2	18.8	14.1
2010	11.4	12.3	15.9	15.3	18.1	12.2	13.6	17.8	14.9
Non-Performing Assets [NPA]									
2005	0.6	3.5	1.0	0.7	2.6	8.6	5.2	3.5	1.8
2006	0.6	3.0	0.9	0.8	2.4	7.1	3.3	3.5	1.1
2007	0.6	2.7	0.9	1.4	2.5	6.2	2.5	3.0	1.4
2008	1.3	2.8	1.6	3.0	3.8	2.4	2.3	3.1	3.9
2009	2.0	3.6	3.5	5.4	9.5	1.6	2.3	4.2	5.9

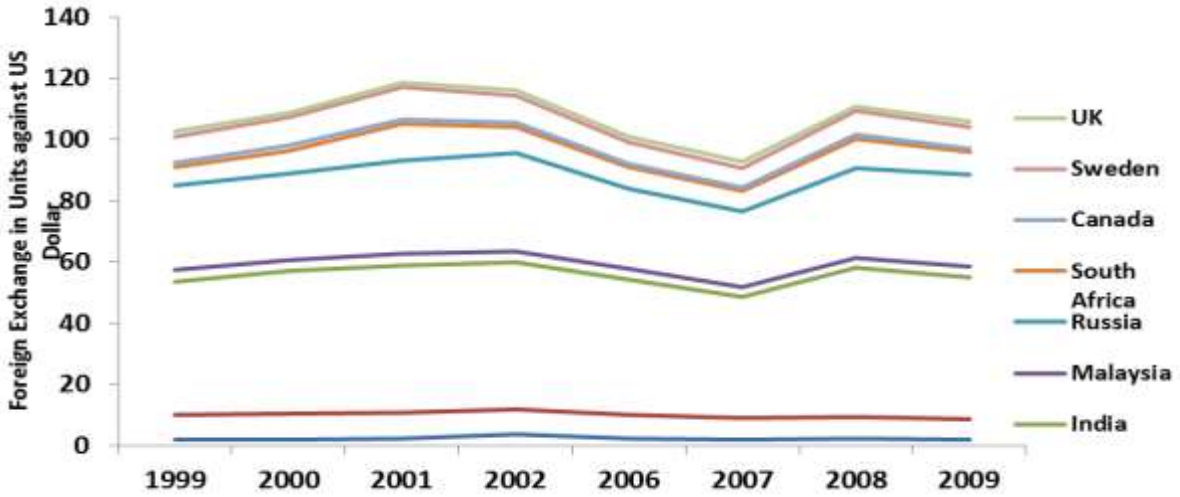
2010	2.2	4.2	4.0	4.9	8.2	1.1	2.4	3.1	5.8
Provisions to NPA s									
2005	17.6	…	54.0	154.8	176.9	24.8	60.3	179.7	59.4
2006	17.6	…	54.6	134.8	170.8	34.3	58.9	179.9	54.5
2007	18.3	…	…	91.7	144.0	39.2	56.1	181.9	44.9
2008	21.9	70.0	38.1	74.4	118.4	116.4	52.6	189.0	31.4
2009	22.6	63.2	41.1	57.7	95.8	155.0	52.1	156.7	29.6
2010	22.0	62.3	35.4	64.2	103.7	218.3	51.5	171.1	32.6
Return on Assets [ROA]									
2005	1.8	0.6	0.8	1.8	3.2	0.6	0.9	3.0	1.2
2006	1.7	0.6	0.5	1.8	3.3	0.9	0.9	2.7	1.4
2007	1.6	0.4	0.4	1.2	3.0	0.9	0.9	2.9	1.4
2008	0.9	0.0	-0.4	-0.1	1.8	1.0	1.0	1.4	2.1
2009	1.0	0.4	0.1	-0.1	0.7	0.9	1.1	1.9	0.9
2010	1.2	0.6	0.2	0.9	1.9	1.0	1.1	2.1	1.0
Return on Equity [ROE]									
2005	25.6	11.8	11.8	17.8	24.2	15.1	13.3	29.8	15.2
2006	27.8	14.0	8.9	17.2	26.3	14.9	12.7	27.6	18.3
2007	30.2	9.8	6.2	11.2	22.7	16.7	13.2	28.9	18.1
2008	18.9	-1.0	-10.3	-1.6	13.3	17.1	12.5	14.9	28.7
2009	17.4	8.2	2.6	-0.6	4.9	16.2	13.1	20.4	15.8
2010	20.5	13.3	3.9	8.2	12.5	17.5	12.5	21.7	14.7

Data Source: IMF – All Countries FSI Data

Foreign exchange rate movements of select countries (Figure-1) indicate that few years before the crisis the foreign exchange markets of countries witnessed exponential growth in turnover in the domestic foreign exchange markets and experienced enormous volatility and downfall during the recession.

Figure-1: Foreign Exchange Rate Movements of Select Countries

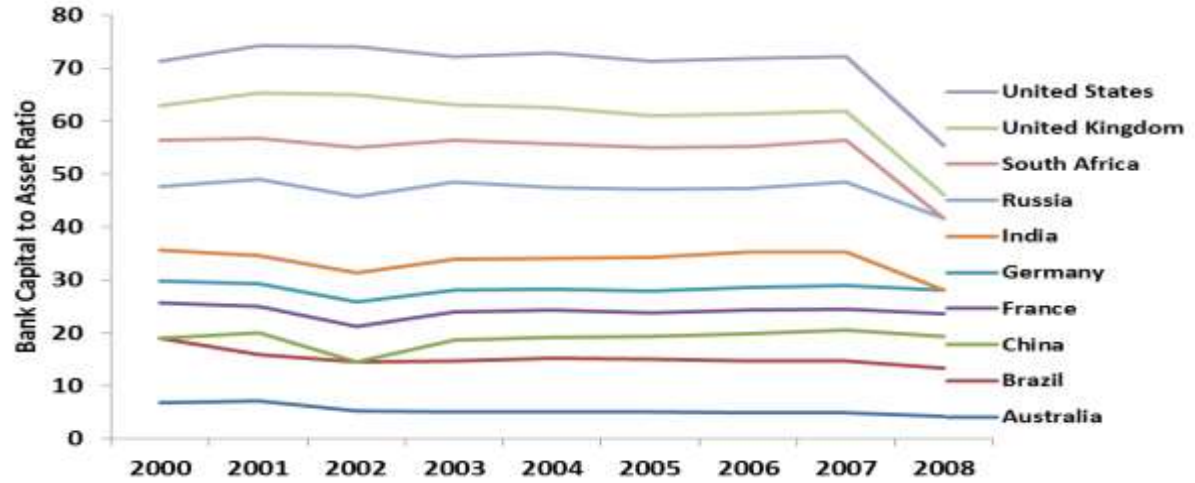
(Units per U.S Dollar)



Source: Global financial stability report, IMF

The ratio of bank capital to assets (an approximate inverse of leverage) of select countries (figure-2) shows that India's ratio, though comfortable, has been below that of South Africa, Russia, UK, and USA. Further, the ratio has experienced a steep secular fall during the crisis period for most of the countries.

Figure-2: Bank Capital to Asset Ratio

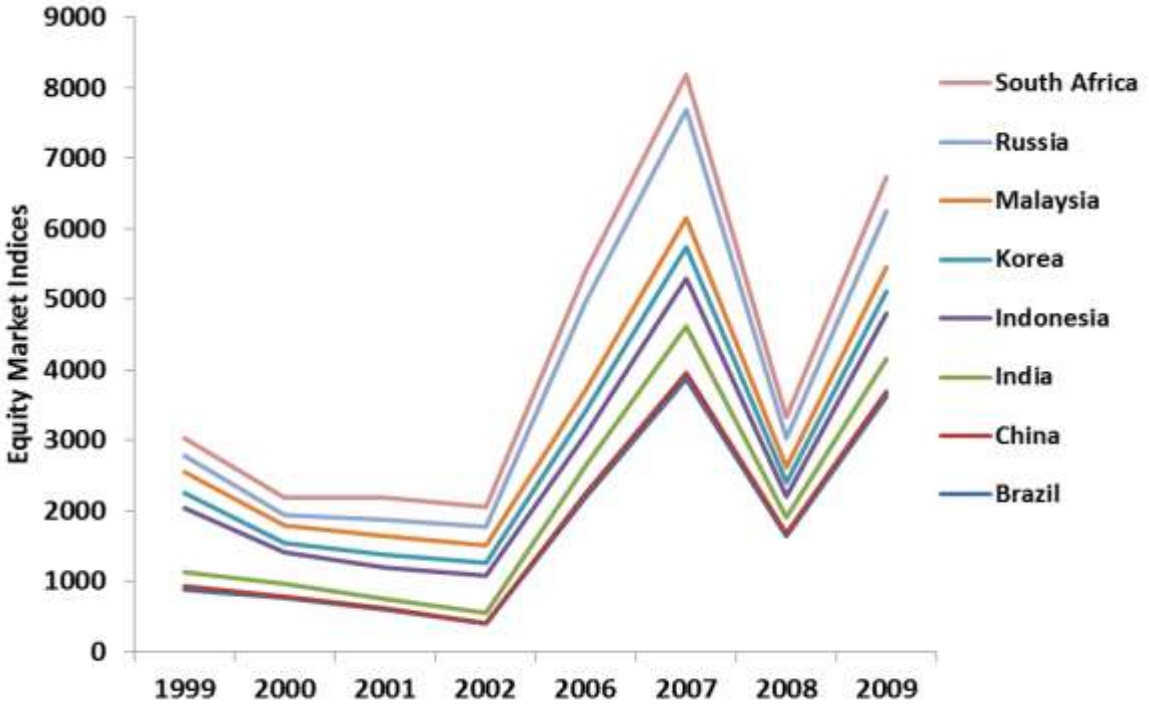


Data Source: World Bank Database

Equity market movements are sensitive to economic as well as financial activities in an economy that do make sense in indicating the trend of financial stability. Movement of equity

markets in emerging markets (Figure-3) indicates that before the crisis, there was a huge build up and the markets crashed during the crisis and have now again showing signs of recovery.

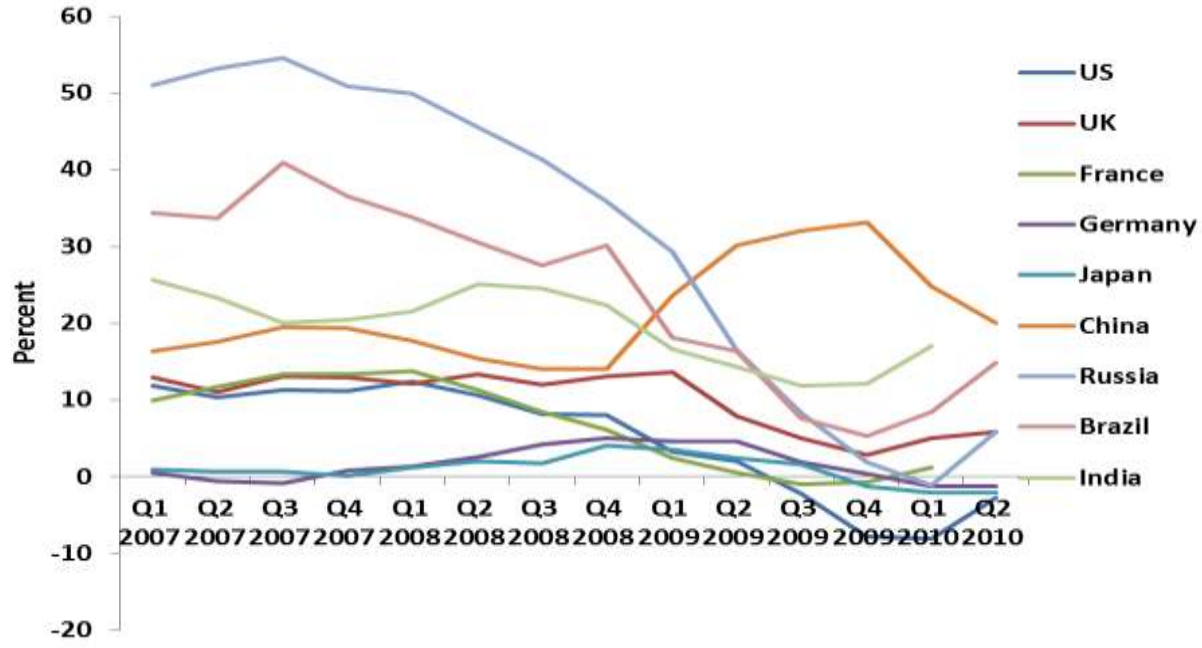
Figure-3: Movement of Equity Market Indices in Emerging Markets



Source: Global financial stability report, IMF

Growth in bank credit to the private sector has decelerated in advanced economies, and lower quality borrowers lacked any access to capital market funding. Bank lending has continued to remain restricted, despite unconventional policies aimed at reviving credit to end users (Figure-4).

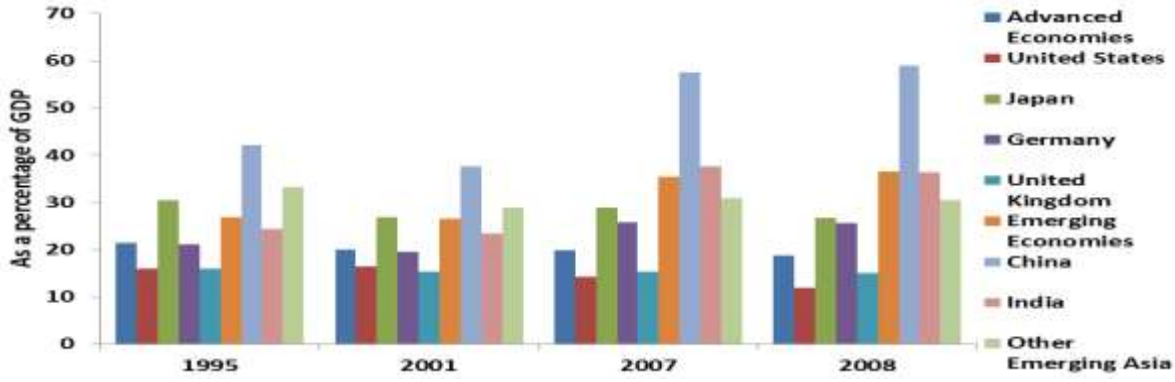
Figure-4: Growth in Bank Credit to Private Sector



Note: Growth rate over the corresponding quarter a year ago Source: DataStream, IMF, IFS

In both emerging and advanced economies too, the huge global current account imbalances have been manifested in the savings investment behaviour. This is the reason why global imbalances are universally ascribed to the 'savings glut' hypothesis, according to which the US current account deficit was driven by a savings glut in the rest of the world, especially in emerging market countries (Bernanke, 2005). Even though the gap between savings and investment in the US almost doubled from minus 2.7 percent of GDP in 2001 to minus 5.6 percent of GDP in 2008, the contrary was noticed in the case of Emerging Market Economies (EMEs) where excess savings led to significant current account surpluses (Figure-5).

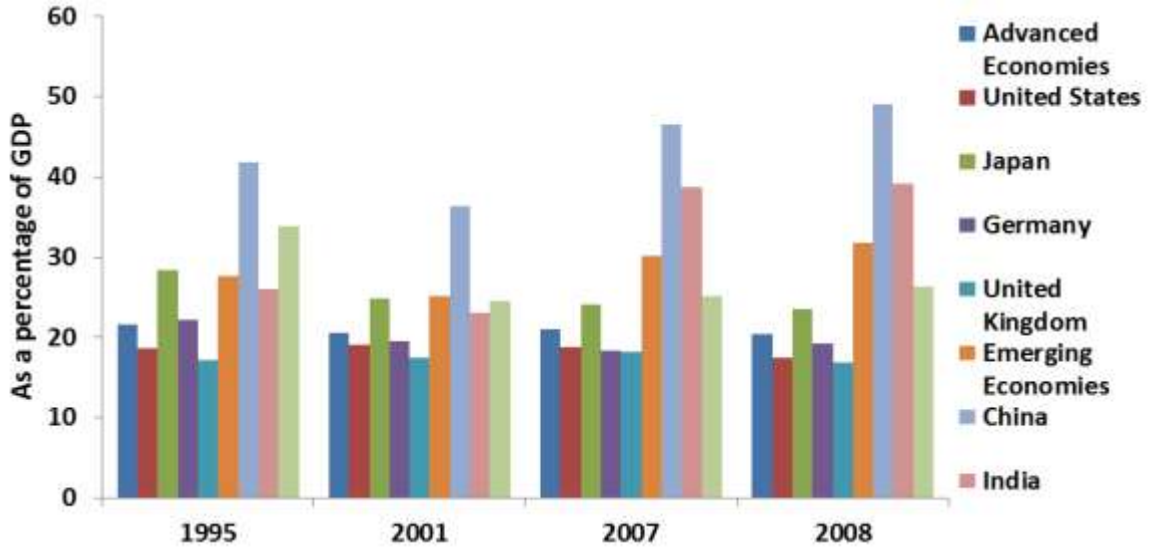
Figure-5: Savings as a percentage of GDP in select economies



Source: World Economic Outlook, October 2009, International Monetary Fund

The saving-investment balances also varied across EME regions in the pre-crisis period. In China, the saving rate reached 59 percent of GDP in 2008 even though China maintained one of the highest investment rates in the world of around 49 per cent of GDP. Despite the fact that India too witnessed a steep rise in the saving rate, the savings investment gap remained negative due to an equivalent increase in the investment rate (Figure-6). Other Asian emerging economies have experienced a modest rise in saving and investment rates between 2003 and 2007, with both remaining below the levels preceding the Asian crisis.

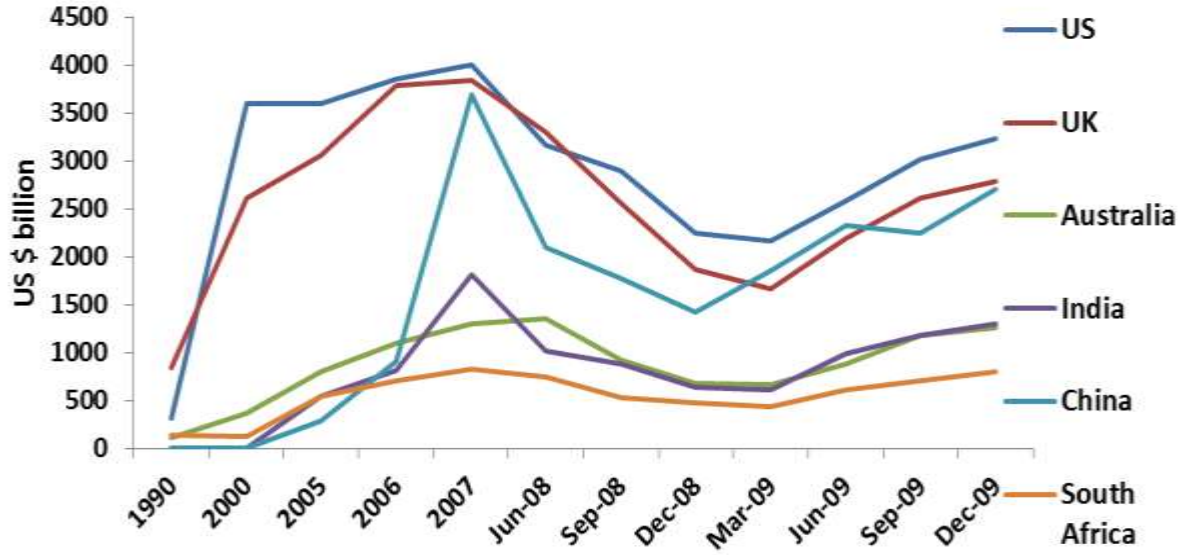
Figure-6: Investment as a percentage of GDP in select economies



Source: World Economic Outlook, October 2009, International Monetary Fund

Stock market capitalisation of many economies, which started declining from the first half of 2008, continued the same trend till the first quarter of 2009 (Figure-7). On the other hand, notwithstanding the considerable recovery, stock market capitalisation has continued to remain lower than the 2007 level, for most of the emerging economies at the end of 2009.

Figure-7: Cross-Country Stock Market Capitalisation

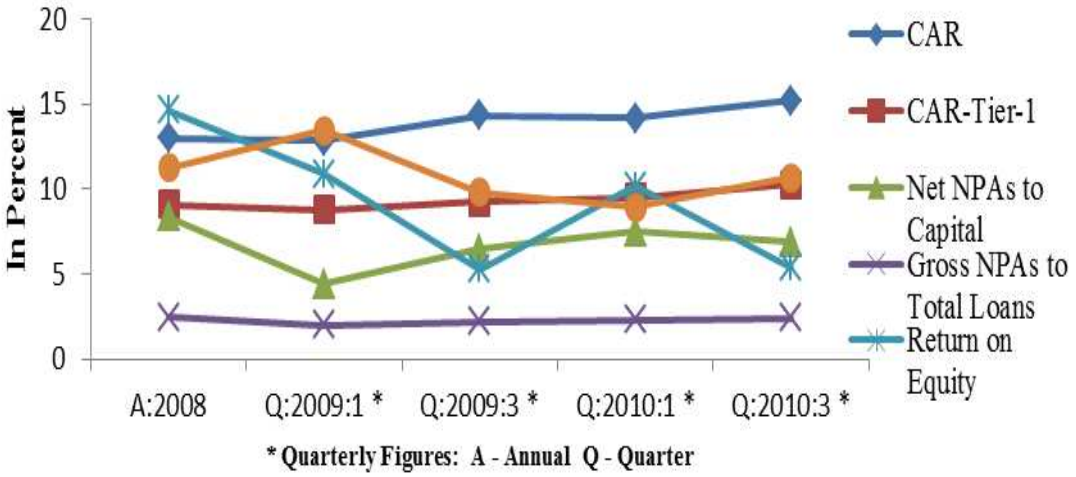


Source: World Federation of Exchanges, Source: Report on Currency and Finance- 2008-09, RBI

2.6 Financial Soundness in Indian Banking

Banking sector is by far the most central part of the financial system in most of the emerging economies and is, therefore, also the main source of risk for financial stability. Undoubtedly, financial soundness of banks has a significant sway on the stability of the financial system as a whole as the banking system constitutes more than 75% of the financial markets in India. The Indian banking system endured the onslaught of the global financial crisis and a factor that bolstered the normal functioning of the banking system even in the face of one of the largest global financial crisis was its robust capital adequacy. Further, the core banking sector indicators for India like; Capital Adequacy Ratio (CAR), Capital Adequacy Ratio–Tier-1, Gross Non-Performing Assets (GNPAs) to total loans, Net Non-Performing Assets (NNPAs) to total loans and Return on Equity (ROE) have experienced downward pressure during the recent recession period (Figure-8). On the contrary, liquid assets to total assets ratio has moved upwards indicating the tendency of the banks to hold cash during the times of recession instead of investing in loans or investment products.

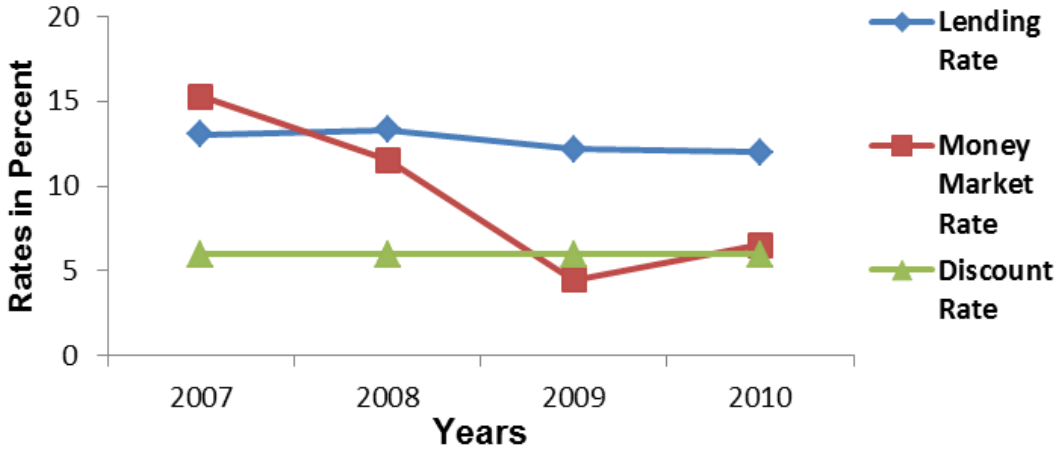
Figure-8: Core Banking Sector Indicators for India



Data Source: International Financial Statistics (IFS) of IMF

Interest Rates (Benchmark prime lending rate), Money market rate and the discount rates) which have significant impact on the lending activity showed downward movement in the Indian banking scenario (Figure-9).

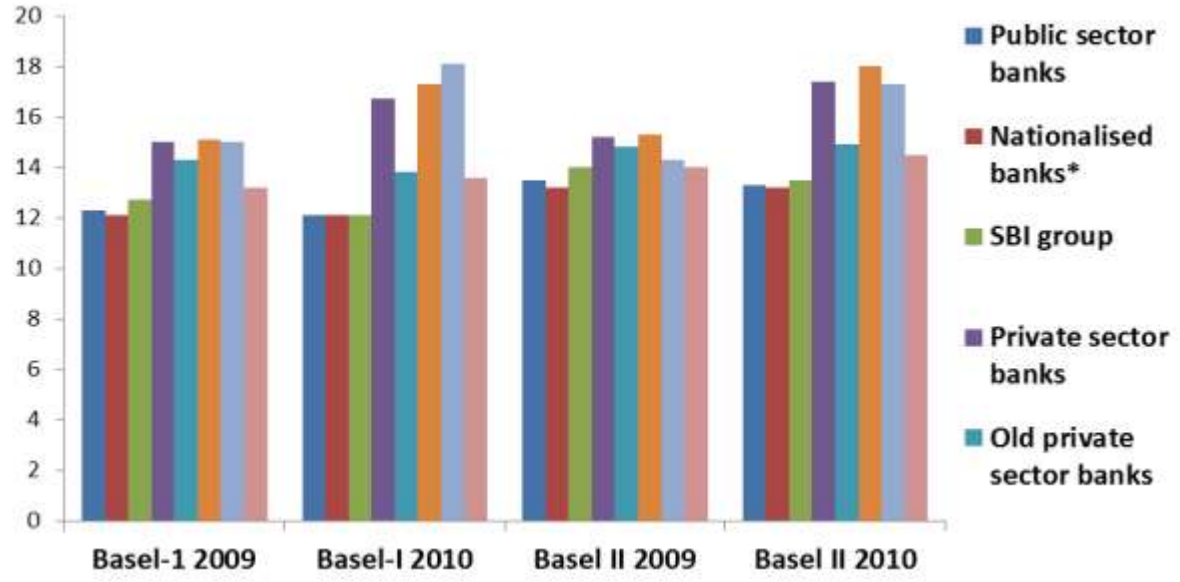
Figure-9: Interest Rates in India



Data Source: International Financial Statistics (IFS) of IMF

Under Basel II, Capital to Risk-weighted Assets Ratio (CRAR) of Indian banks as at end-March 2009 was at 14.0 per cent, far above the stipulated level of 9 percent (Figure-10). This suggests that Indian banks have successfully managed to meet the increased capital requirement under the amended framework.

Figure-10: Capital to Risk Weighted Assets Ratio–Bank Group-wise (As at end-March)



Note: *: Includes IDBI Bank Ltd Source: Report on Trend and Progress of Banking in India 2009-10 of RBI

Furthermore, between March 2009 and 2010, there was a surge by about 0.5 percentage point in the CRAR reflecting further strengthening of their capital adequacy under the new framework.

3. METHODOLOGY AND DATA

In view of the fact that assessment of financial stability in general is made on a broad-spectrum of risk factors, one cannot expect a single model to capture satisfactorily all the risk factors originating and developing inside and outside the financial system respectively. Instead, a suite of models may be required. However, the objective of the ensuing segment of this paper is to analyse the salient parameters of banking sector performance and behaviour and develop a simple and fundamental axiomatic index that can depict the banking sector stability in simple terms at macro level. The index is modelled to capture the primary indicators of stability and in the banking sector, and depict the volatility in the composite measure. For this purpose, a panel data involving weightages for the variables of bank performance and behaviour for the period from 1996 to 2009 covering 56 commercial banks in India is constructed.

Data and Variables

The data for the analysis is sourced from the robust database of Reserve Bank of India. The variables might be considerably adopted to measure the degree of volatility and soundness in the banking sector and thereby influences the financial stability are listed here below in table-3.

Table-3: Description of Key Variables

Variable	Description
Capital Adequacy Ratio (CAR)	Defined as the amount of regulatory capital to be maintained by a bank to account for various risks inbuilt in the banking system Capital Adequacy Ratio=$\frac{\text{Total Capital (Tier I Capital+Tier II Capital)}}{\text{Market Risk (RWA) + Credit Risk (RWA) + + Operation Risk (RWA)}}$ *RWA = Risk Weighted Assets* The higher the ratio the better is for the bank's stability.
Return on Assets (ROA)	Return on Assets = Net Profit/Assets = (Net Profit/Total Income)*(Total Income/Assets) The higher the ratio the better is for the bank's stability.
NNPA(Net Non-Performing Assets) to NA (Net Advances)	Net NPA to Net Advances = Net NPA/Net Advances The lower the ratio the better is for the bank's stability. Management of non-performing assets is a key to the stability and continued viability of the banking sector.
Total Assets (TA)	The total assets of the scheduled commercial banks were used to provide weights, for each commercial bank. The higher the value the better is for the bank's stability.
Liquidity Coverage Ratio (LCR)	Liquidity Coverage Ratio = $\frac{\text{(Cash+SLR+other short term investments)}}{\text{Short term liabilities}}$ The lower the ratio indicates less liquidity.
GDP growth rates	Gross Domestic Product growth rates for the period from the year 1996 to 2009.

The Model

This study defines Banking Stability as a function of capital adequacy, return on assets, Non-performing assets and Liquidity coverage ratio. In equation form, the hypothesis is presented as below:

$$BSI_t = f\ \{car_t, roa_t, npa_t, lcr_t\} \qquad \longrightarrow (1)$$

After considering the weighted values $(w_i)_{\text{ of}}$ the stated variables and accounting for the change in the determinant for the period, the equation is rewritten as below:

$$BSI_t = w_1 car_{t-1} + w_2 roa_{t-1} - w_3 npa_{t-1} + w_4 lcr_{t-1} \qquad \longrightarrow (2)$$

Available literature mentions quite a few methods for determining the weights of the variables. Mostly, these are econometric estimations with a macroeconomic model, a reduced form aggregate demand function (backward looking IS curve), or a Vector Auto regression Model (VAR). This study opines that the weights can also be determined by way of economic arguments, such as the significance of the variable for the banking system. This study, on the other hand, feels that every variable in the index can be given equal weight. Some studies employ the combination of above methods (Goodhart and Hofmann, 2001 and Gauthier et al, 2004). The weighting factors are calculated by summing the coefficients of the variables and expressing them as a ratio (Montagnoli and Napolitano, 2004):

$$\text{Weighted variable } X_i\ (W_i) = \frac{\sum Coefficient\ X_{i,t,..n}}{\sum |Coefficient\ X_{i..n,,t,..n}|} \qquad \longrightarrow (3)$$

By this approach, both the importance of the parameters of banking system and the changes of its composition are duly taken into account for the analysis.

Accordingly,

$$\text{Index Variable} = \frac{\text{Weighted variable } X_t - X_{t-1}}{\text{Weighted variable } X_t} \qquad \longrightarrow (4)$$

BSI describes the health of the banking system's stability and is in essence an ex-post information index. Due to its very nature, it is not envisioned to forecast stability, but definitely, a trend can be observed for future financial stability.

4. ANALYSIS AND RESULTS

This study considers the core set of soundness indicators for the construction of the index keeping in view the applicability of these determinants to the deposit taking institutions (banking sector) in Indian financial system. *Capital adequacy* measured by regulatory capital to risk-weighted assets measures the strength of the banking system in terms of capital adequacy to sustain the challenges of adverse impacts of crisis like situations. *Asset quality* measured Nonperforming assets to total advances. *Earnings and profitability* measures are represented by Return on assets and *Liquidity* is measured by LCR. The values of the weighted variables calculated as per the model are furnished in table-4.

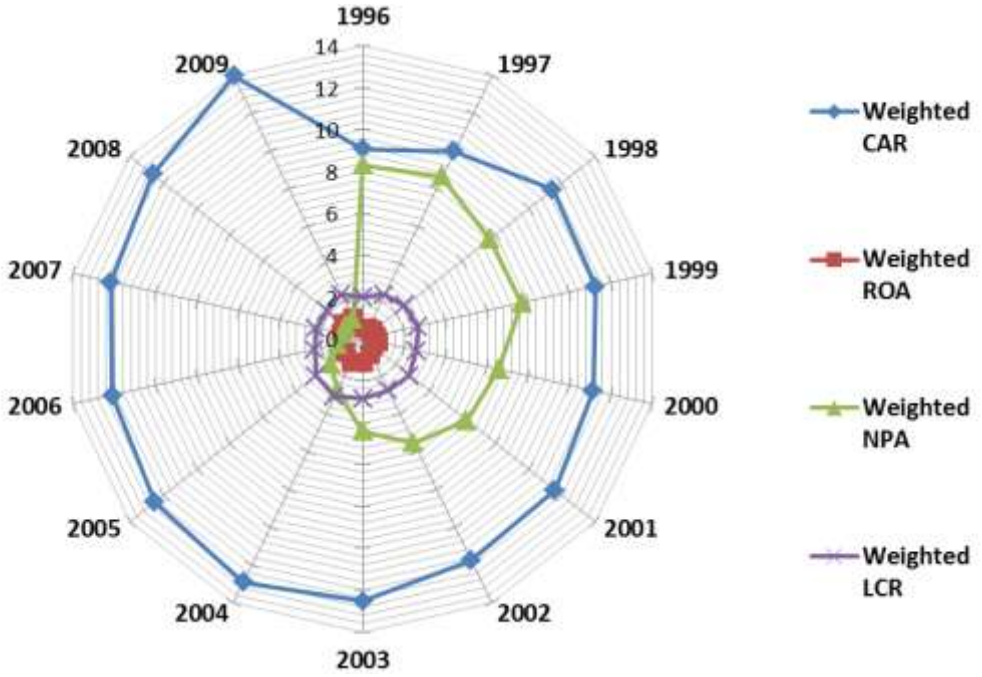
Table-4: Values of the determinants of banking stability

Year	Weighted CAR	Weighted ROA	Weighted NPA	Weighted LCR
1997	0.094	0.149	0.038	0.169
1998	0.150	0.093	-0.111	0.086
1999	-0.017	-0.004	0.003	0.049
2000	-0.008	0.197	-0.146	-0.031
2001	0.040	-0.160	-0.045	0.086
2002	0.015	0.366	-0.122	-0.029
2003	0.065	0.315	-0.199	0.051
2004	0.031	0.135	-0.378	0.060
2005	-0.029	-0.173	-0.306	-0.076
2006	-0.036	-0.018	-0.358	-0.181
2007	0.007	0.038	-0.181	-0.019
2008	0.038	0.095	-0.001	-0.045
2009	0.104	-0.065	0.079	0.088

Source: Outcome of the analysis of this study

Further, a cobweb graph is developed to capture the trend of the determinants of banking stability by using the weighted values for all the variables for the study period (figure-11).

Figure-11: Trend of Determinants of Banking Stability in India



Source: Outcome of the analysis of this study

In the next step, Banking Stability Index (BSI) by using the weighted values of CAR, ROA, NPA and LCR is constructed. The values of BSI for the study period are as presented here below in table-5.

Table-5: Banking Stability Index for the period from 1997-2009

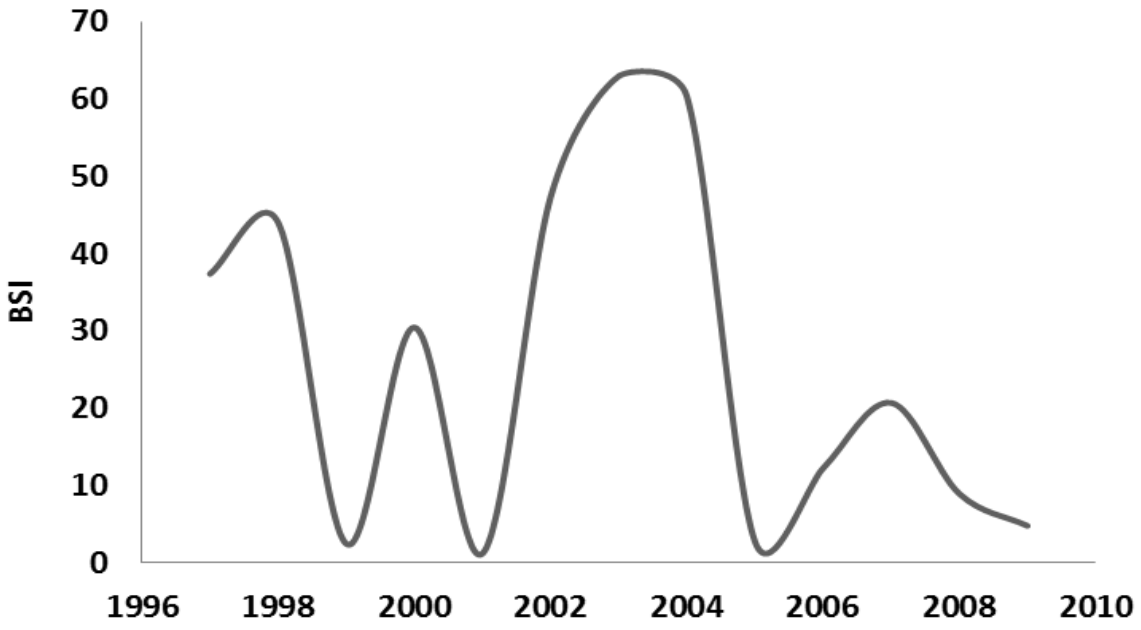
Year	Banking Stability Index [BSI]
1997	37.40
1998	44.05
1999	2.48
2000	30.48
2001	1.23
2002	47.41
2003	62.98
2004	60.35
2005	2.74

2006	12.28
2007	20.72
2008	8.95
2009	4.81

Source: Outcome of the analysis of this study

Further, the movement of bank stability index for the study period is presented in the graphical form in figure-12 here below.

Figure-12: Movement of Banking Stability Index for the period 1997-2009



Source: Outcome of the analysis of this study

As depicted by the graph the banking stability index was higher in 2002 to 2004 but a sharp fall was seen in 2005. Again, a continuous decline is observed in 2008 and 2009 after the increase in banking stability index in 2006 and 2007 indicating that banks faced uncertainty as well as instability leading to a threat for financial stability during that period.

The estimated results show that banking instability affect the financial stability of the economy and banking stability can be determined by the movement of crucial indicators employed in the study. In addition, variables related to banking system seem to be critical factors in maintaining the stability of the financial sector.

5. CONCLUSION

Of late, financial stability has been explicitly signified as a key objective for public policy. Even though the multi-facetted concept of financial stability is by nature complex to abstract in a single definition, an attempt has been made to define, financial stability as a situation in which the financial system achieves efficient allocation of resources between economic activities and across time, assesses and sustains financial risks, and absorbs shocks. A well-functioning banking system is essential to sustain economic growth, both to prop up the economic activities in the short run and to allocate resources efficiently over the longer run. Indian banking system has largely withstood the global financial crisis, thanks to the regulatory approach of the reserve bank of India. Banking system development and broadening a more transparent investor friendly capital market capitalization also help strengthening financial stability.

The overall approach to sustain financial stability has to be multi-pronged. Ensuring overall macroeconomic balance, enhancement in the macro-prudential functioning of institutions and markets, and reinforcement of micro-prudential institutional soundness through regulation and supervision need to be regularly undertaken towards financial stability. Financial markets are rapidly growing by way of technology adoption, product innovation, and geographic and sectoral integration. This swift development of financial markets while contributing to enhanced financial stability may also throw up both benefits and new sources of risks to financial system.

The study has enabled us to understand that the financial system and more specifically the banking system in India has demonstrated continued stability compared to other countries. One of the accomplishments of the Indian financial system has been safeguarding financial stability and avoidance of any major financial crisis since early 1990s till 2008 a period that has been turbulent for the financial sector in most emerging market countries.

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