

A systematic approach to identify systemically important firms

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**Indira Gandhi Institute of Development Research, Mumbai
October 2013**

<http://www.igidr.ac.in/pdf/publication/WP-2013-021.pdf>

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Abstract

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Keywords: systemic risk, systemic risk index

JEL Code: C13, G12, G29, G31

Acknowledgements:

We thank Saugata Bhattacharya, K. N. Vaidyanathan, and the participants of the IGIDR Finance Research Group Roundtable on systemic risk measurement, December 2012, for useful discussion and comments. We thank Brandon D'Souza for research assistance. The views expressed in this paper belong to the authors and not their employer.

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Keywords: Systemic Risk Measures; Systemically Important Firms

JEL classification: G12; G29; C13; G31.

*URL: <http://www.ifrogs.org> Please email questions and comments to: susant@igidr.ac.in We thank Saugata Bhattacharya, K. N. Vaidyanathan, and the participants of the IGIDR Finance Research Group Roundtable on systemic risk measurement, December 2012, for useful discussion and comments. We thank Brandon D'Souza for research assistance. The views expressed in this paper belong to the authors and not their employer.

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1 Introduction

There has been fresh interest in measuring systemic risk since the 2008 crisis, which brought the realisation that prudential regulation of individual financial firms was not enough to manage the risk of the financial sector. The event highlighted, not just how the health of firms within a country were interlinked in such an episode, but also the health of the financial sector in other countries.

In response, many countries now produce a ‘Financial Stability Report’, each of which is grounded in certain datasets and mechanisms for measurement.¹ The IMF has worked for the G-20 in constructing a Systemic Risk Toolkit (Blancher *et al.*, 2013). The work of the Office for Financial Research in the US has helped galvanise research in this field with a greater link between academic research and policy practitioners (Bisias *et al.*, 2012).² These measurement exercises have two areas of focus. One is the potential build up of risk in the system based on various macro-economic and market-wide indicators of stress. The other lies in identifying systemically important financial firms (SIFIs).

The identification of SIFIs has direct salience for the conduct of policy makers in the future. If it is clear that the failure of a firm is likely to have substantial externalities upon the overall financial system, this shapes choices about micro-prudential regulation of financial firms, and about government intervention when a given firm approaches failure. Numerous methods have been proposed for identifying SIFIs in the literature. One constraint faced in this field is about data availability. While a financial system that is more fully developed has a wealth of information owing to measures constructed from a more complete system of financial markets (such as implied volatility of options), the information set is inferior in emerging markets.

In this paper, we set out to identify SIFIs in one large emerging market, India. As with the rest of the world, there were important disruptions in the Indian financial system in 2008, which drew crises and emergency measures by the government and the central bank. We identify three measures where implementation is feasible and grounded in good quality data – granger causality (GC), marginal expected shortfall (MES) and conditional value at risk (CoVaR). The paper calculates and observes the characteristics of these three measures from 2000 to 2012.

The availability of multiple measures makes it difficult to uniquely identify SIFIs. Each measure has a plausible underpinning, but each either identifies different firms as SIFI or ranks each SIFI differently. We propose a Systemic Risk Index (SRI) which is an aggregate measure of systemic risk based on the

¹Table A.1 in the Appendix presents a summary of systemic risk measures from six Financial Stability Reports across the globe.

²A list of the measures used in both the work of the IMF and the OFR is presented in Table A.2.

average of percentile rankings by the individual measures. The results shown in this paper on the usefulness of this SRI are encouraging. This can be a useful direction in this field analogous to the idea of forecast combination.

As elsewhere in the world, there were important interconnections between non-financial firms and financial firms in the global crisis of 2008 in India. The three measures – GC, MES, CoVaR – are all applicable for all firms with a liquid stock price. We extend the conventional analysis of SIFIs by incorporating non-financial firms into the framework. The results are striking: non-financial firms are repeatedly among the most important SIFIs of the country, and central bank interventions in 2008 do relate to the firms identified.

The contribution of this paper lies in three respects. In our knowledge, this is one of the first papers bringing ideas from the field of systemic risk to India, and is thus part of the nascent literature on systemic risk in emerging markets. We propose a method for combining multiple measures into a single Systemic Risk Index or SRI. We integrate non-financial firms into the identification of SIFIs, which brings fresh insights into the interconnections between financial and non-financial firms.

The rest of the paper is organized as follows. Section 2 describes the background setting for this work, the measures used in the paper and the methodology used to calculate the SRI in Sections 2.1 and 2.2. Section 3 provides a brief description of the data. The results are presented in Section 4, where the performance of the measures are first discussed in Section 4.1. This is followed by an analysis of the variation of the risk measures, both cross-sectional and temporal, for the 50 largest firms in Section 4.2 and for banks in Section 4.3. Section 4.4 presents the classification of SIFIs and SIFs by the SRI of firms, while Section 4.5 discusses the usefulness of monitoring the systemic risk of non-financial firms. Section 5 concludes.

2 Approach and methodology

The work in this paper shares a similar focus to the growing body of literature that focus on developing systems that regularly monitors the risk in the overall system as well as those of systemically important financial institutions or SIFIs. Bisias *et al.* (2012) summarises the literature with a survey of 36 different measures on systemic risk.

Of these, we focus on three measures in this paper, which have been deployed in both developed and emerging economies: Granger Causality (GC) Billio *et al.* (2012), Marginal Expected Shortfall (MES) Acharya *et al.* (2012) and Conditional Value at Risk (CoVaR) Adrian and Brunnermeier (2008).

These measures have been widely used to identify SIFIs in both developed and emerging economies. Sedunov (2013) and Neale *et al.* (2012) compute the

GC measure to analyze the degree of interconnectedness between and among various players in the US financial system. Idier *et al.* (2013) and Benoit *et al.* (2012) compute the MES for the US financial system, Acharya and Steffen (forthcoming) for the European banking sector, Giglio *et al.* (2013) for the US, France, Germany, Italy, and Spain, and Talashi (2013) for the Turkish financial system. Bjarnadottir (2012) compute the CoVaR for the Swedish financial system, Wong *et al.* (2011) for the Hong Kong banking system, Arias *et al.* (2010) for the Colombian financial system, and Roengpitya and Rungcharoenkitkul (2010) for the Thai banking sector. Acharya *et al.* (2010) and Acharya and Kulkarni (2012) compute MES for banks in India for a six month period between January and December 2007.

2.1 Individual risk measures

Bisias *et al.* (2012) presents the calculation of the three risk measures selected in this paper as follows:

- *Granger Causality*, GC:

Billio *et al.* (2012) measure the degree of interconnectedness between firms and the directionality of such relationships using GC: X_t is said to “Granger-cause” Y_t if past values of X_t contain information that helps predict Y_t above and beyond the information contained in the past values of Y_t alone.

$$X_t = \sum_{j=1}^l a_j X_{t-j} + \sum_{j=1}^l b_j Y_{t-j} + \epsilon_t \quad (1)$$

$$Y_t = \sum_{j=1}^l c_j X_{t-j} + \sum_{j=1}^l d_j Y_{t-j} + \omega_t \quad (2)$$

where ϵ_t and ω_t are two uncorrelated white noise processes and l is the maximum lag considered.³ The causality implies that Y_t causes X_t when b_j is different from zero. Similarly, X_t causes Y_t when c_j is different from zero. When both of these statements are true, there is a feedback relationship between X_t and Y_t .

Billio *et al.* (2012) compute different types of interconnections and identify the number of *out*-connections as the best measure of systemic risk. We compute the GC measure as the proportion of significant *out*-connections for each firm given as:

$$100 \times \frac{\text{Number of out-connections}}{\text{Total number of possible connections}} \quad (3)$$

³Chosen based on the “Bayesian Information Criterion” (BIC; see Schwarz (1978)). A test of causality is conducted based on the F-test of the null hypothesis that the coefficients b_j or c_j are zero based on the direction of causality.

- *Marginal Expected Shortfall, MES:*

Acharya *et al.* (2012) propose the MES to capture the tail dependence of the stock returns of a firm on the market as a whole. MES_t^i for a firm i at time t is defined as the average returns (R_t^i) of its equity during the five percent worst days for overall market return (R_t^m).

$$MES_t^i = \frac{1}{k} \sum_k R_{kt}^i \quad (4)$$

where k denotes the number of days when system is in its 5% tail. MES_t^i is the amount of market capitalisation a firm stands to loose on the worst days of the market. The greater the MES_t^i , the more vulnerable the firm is to a crisis.

- *Conditional Value at Risk, CoVaR:*

Adrian and Brunnermeier (2008) propose a measure of systemic risk that captures the marginal contribution of a firm to the overall systemic risk. $\Delta CoVaR_q^{j|i}$ is calculated as the difference between the $VaR_q^{j|i}$ of the financial system j conditional on the distress of a firm i and the $VaR_q^{j|i}$ of the financial system j conditional on the median state of the firm i .

$$\Delta CoVaR_q^{j|i} = CoVaR_q^{j|i} - CoVaR_{50\%}^{j|i} \quad (5)$$

$$= \beta^{j|i} (VaR_q^{j|i} - VaR_{50\%}^{j|i}) \quad (6)$$

where $\beta^{j|i}$ is obtained by running quantile regressions twice: once for the desired q and once for $q = 50\%$. We estimate $\Delta CoVaR_q^{j|i}$ at $q = 1\%$.

It is calculated as quantile regressions which are run on the growth rate of market valued total assets X_t^i at time t as a function of state variables M_t . Here, X_t^i is given by:

$$X_t^i = \frac{ME_t^i \times LEV_t^i - ME_{t-1}^i \times LEV_{t-1}^i}{ME_{t-1}^i \times LEV_{t-1}^i} \quad (7)$$

$$= \frac{A_t^i - A_{t-1}^i}{A_{t-1}^i} \quad (8)$$

where $A_t^i = ME_t^i \times LEV_t^i$, ME_t^i denotes the market value of firm i 's total equity at time t , and LEV_t^i is the ratio of total book assets to book equity of firm i at time t . Essentially, equations 7 and 8 are simply applying the market-to-book equity ratio to transform book-valued assets into market-valued assets. For a list of state variables M_t used in the quantile regressions refer to Table 1 in Section 3.

$\Delta CoVaR_q^{j|i}$ measures the risk on the financial system posed by individually "systemically important" firms i , which are so interconnected and large that

they can cause negative risk spillover effects on others, as well as by smaller institutions that are “systemic” when acting as part of a herd. It also captures institutional externalities such as “too big to fail”, “too interconnected to fail”, and crowded trade positions, and a higher $\Delta\text{CoVaR}_q^{j|i}$ implies greater negative risk spillover effects.

2.2 An index of systemic risk, SRI

Each of the measures described above captures one specific aspect of the multifaceted nature of systemic risk, which are then used to identify SIFIs. But each of the measures identify different firms as SIFIs. The differences can be both in which firms are SIFIs, as well as in their relative ranking of which are more systemically important.

For example, the GC measure captures the extent to which a firm is interconnected with others. The higher the number of interconnections, the more probable the firm’s failure will cause a systemic shock. However, if the MES or CoVaR of the same firm is small – either because the firm is relatively small in the economy, or because it is not risky – then a highly interconnected firm need not necessarily be systemically important. This suggests the need to aggregate the individual measures into a single index which then can be used to identify a unique set of SIFs, rather than using any one individual measure.

A recent study by Giglio *et al.* (2013) finds that individual measures of systemic risk provide limited success in forecasting future downside macro-economic shocks. The paper combines multiple individual measures to construct systemic risk indexes that capture the overall systemic risk posed by the financial sector. They then apply these indexes to forecast economic downturns in the US and Europe. They find that forecasts based on these indexes are more robust compared to forecasts based on individual measures.

In this paper, we extend this scant literature by proposing a technique that aggregates individual measures to construct a systemic risk index. In contrast to the study by Giglio *et al.* (2013) that estimates systemic risk indexes for the financial sector from aggregated institution-specific individual measures, we compute an index for each firm in the system with the aim to identify a unique set of SIFIs in the economy at a given point in time.

The approach involves calculating a systemic risk index (SRI) for a firm i . This value can vary for firm i at different points in time. At a given point in time t , the SRI for firm i is denoted as $\text{SRI}_i|t$ and is computed using the following process:

1. Calculate individual measures of systemic risk: GC, MES, and CoVaR for each firm i in the sample at time t .

2. Compute the percentile rank of each firm i based on each measure individually.⁴
3. Average these percentiles ranks (which are now directly comparable) to obtain the $SRI_i|t$ for each firm i at time t .

Then, for a given set of n firms, $SRI_i|t$ for $i = \{1 \dots n\}$ and at a given point time t , orders the n firms from most SIF to least SIF based on their performance across the three measures of systemic risk. A high $SRI_i|t$ indicates that the firm i performs poorly across all the three measures of systemic risk.

3 Data description

Table 1 Data inputs

The table presents the sources from which the necessary data has been procured to estimate GC, MES, and CoVaR for the 50 largest firms. GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default.

	Source	Frequency	Period
<i>For the GC and MES measures</i>			
Adj. Closing Prices	NSE	Daily	Jan 1999–Sep 2012
<i>For the CoVaR</i>			
Shares Outstanding	CMIE		
Book value per share	CMIE		
Market Capitalisation	CMIE		
Total Assets	CMIE		
3 month Mibor Rate	NSE	Weekly	Dec 1998–Sep 2012
91 day treasury bill yield	RBI		
3 month interest rate	NSE & CCIL		
10 year interest rate	NSE & CCIL		
GDP	RBI	Quarterly	Oct 1999– Jul 2012
RBI, (http://www.rbi.org.in)			
CMIE: Centre for Monitoring Indian Economy Pvt. Ltd. (http://www.cmie.com)			
NSE, (http://www.nseindia.com)			
CCIL: Clearing Corporation of India Ltd. (https://www.ccilindia.com).			

Table 1 summarises the data used to compute the risk measures. Different measures have different data requirements. For instance, the GC and the MES

⁴We compute the ranking of each firm across the three measures of systemic risk by sorting the firms from a high value to low value for each measure. The advantages of this approach are that (a) the results are robust to the alternative ranking methodology, and (b) ‘cardinal’ ranks are independent of the number of firms in the sample. Percentile ranking, which is used here, is a standard ranking methodology. It is used in several applications, one of which is the *ease of doing business* indicator published by the World Bank.

measure requires daily price data, while the CoVaR measure is computed using data at different frequencies.⁵

The measures are calculated for the 50 largest firms that are listed on the National Stock Exchange of India Ltd. (NSE), which includes both financial and non-financial firms. Once the individual measures are calculated for the firm, the systemic risk index (SRI) of the firm can be calculated. The firms are then ranked by order of decreasing systemic risk importance by their SRI. The firms with the highest SRI are systemically more risky while those with lower SRIs are ranked systemically less risky.

We also separately calculate these measures for the 25 largest banks in India in an attempt to identify the systemically important financial institutions (SIFIs). However, there are some caveats to the analysis of this effort. The set covers only banks and not all the financial institutions. The CoVaR measure is then calculated only with respect to the index of these 25 banks, and can be only interpreted as the loss to the banking sector rather than the overall system.

This approach is applied for each quarter during the period from July 2006 to October 2012. The list of the 50 largest firms in each quarter, along with the individual risk measures, as well as the SRI are listed in Appendix B. The banks, or the SIFIs, are highlighted in each list. For example, in Jul-Sep 2006 (Table B.3), only two banks appear as SIFIs among the top 20 systemically important firms or SIFs, while in Jul-Sep 2008 (Table B.11), there are six SIFIs among the top 20 SIFs.

4 Results and analysis

In the following sections, we analyse the behaviour of the systemic risk measures estimated for the 50 largest Indian firms for each quarter from Jul-Sep 2006 to Jul-Sep 2012, presented in Tables B in the Appendix, from the following perspectives:

1. Performance evaluation of systemic risk measures: how do the estimated GC, MES, CoVaR values vary during the crisis of 2008 compared to the periods before and after?
2. What is the distribution of GC, MES and CoVaR of the largest firms in India?
3. How do the values of these measures compare with those of the largest banks?

⁵A longer time series is required for robust estimation of CoVaR since the data used is at a weekly frequency. The CoVaR values for the initial two quarters of 2000 Q1 and Q2 were estimated using six and seven quarters starting 1998 Q4 due to unavailability of data.

4. Is the Systemic Risk Index (SRI) a useful measure to classify SIFs? How does the classification by SRI compare with classification by the individual risk measures?
5. SIFIs or SIFs: Should systemic risk monitoring be carried out for non-financial firms?

4.1 Performance evaluation

While there is a rich literature on the measures of systemic risk, there is very little literature on the performance of these measures, or how to reconcile the differences in the importance and rankings of firms across different measures. What is often presented is a behaviour of the measures before and after the 2008 episode, or anecdotal evidence of the behaviour of specific firms and their measures during these periods.

4.1.1 Behaviour of measures around the 2008 crisis

Since the problem of systemic risk came into focus with the financial crisis of 2008, one evaluation of the different measures may focus on the value of these measures in the period before, during and after this period. We can divide the span of our study into the following three periods - **pre-crisis** (Jul 2006 - Jun 2007), **crisis** (Jul 2007 - Dec 2008), **post-crisis** (2009).

Our hypothesis takes the following form: if these measures capture some or all facets of systemic risk, then they will have significantly different values in the pre-crisis period (lower) compared to the crisis period (higher). We test the hypothesis by examining the summary statistics for the measures in these different periods presented in Table 2. The test of difference in medians between any two periods is conducted based on the Wilcoxon-Mann-Whitney test. The level of confidence is set at 5%.⁶

⁶The detailed results for all pair-wise comparisons are not provided here, but are available upon request.

Table 2 Summary characteristics of systemic risk measures for top 50 firms

The table shows the summary statistics for the GC, MES, and CoVaR measures, computed quarterly for the 50 largest firms. These average value of these are presented for the following sub-periods: overall (1999 - 2012), pre-crisis (Jul 2006 - Jun 2007), crisis (Jul 2007 - 2008), post-crisis (2009), and recent (2011 - 2012).

	Overall	Pre-crisis	Crisis	Post-crisis	Recent
GC (%)					
Min.	0.00	0.00	0.00	0.00	0.00
1st Qu.	4.08	4.08	4.08	6.12	4.08
Median	8.16	8.16	10.20	12.24	6.12
Mean	11.87	11.81	13.46	14.23	8.17
3rd Qu.	16.33	14.29	18.37	18.37	12.24
Max.	67.35	65.31	67.35	51.02	30.61
Std. Dev	10.75	11.95	12.19	10.49	6.73
MES (Rs. Bln)					
Min.	-1.18	1.22	4.06	0.12	0.60
1st Qu.	1.98	6.62	10.34	10.73	6.00
Median	6.22	10.26	17.44	20.98	11.68
Mean	13.24	17.11	26.60	32.77	16.23
3rd Qu.	16.84	22.41	31.66	40.09	23.06
Max.	298.50	84.98	179.90	298.50	85.31
Std. Dev	19.86	16.16	27.33	37.57	14.80
CoVaR (Rs. Bln)					
Min.	0.00	0.00	0.00	0.00	0.00
1st Qu.	0.62	2.35	0.40	0.87	2.98
Median	1.70	4.95	3.79	3.10	5.45
Mean	3.22	5.00	4.94	4.44	5.80
3rd Qu.	4.81	6.59	7.02	6.16	8.27
Max.	32.24	18.37	32.24	26.54	18.70
Std. Dev	3.84	3.48	5.62	4.88	3.87

We find that the median GC was at 8.16% for pre-crisis period, 10.20% for the crisis period and 12.24% for the post-crisis period. This implies that the degree of interconnectedness between firms was significantly higher during the crisis, and continued to be high during the post-crisis period. In contrast, the firms are substantially less interconnected in the recent period (2011-2012), where the median GC measure is at 6.12%.

In terms of potential losses that the firms faced, the median MES was Rs.10.26 billion for the pre-crisis period, which rose significantly to Rs.17.44 billion during the crisis. There was a persistence of the risk during the post-crisis period, where the median MES was Rs.20.98 billion. Like the GC, the MES is significantly lower at Rs.11.68 billion in the 2011-2012 period.

In contrast to the increase in the GC or the MES, the median CoVaR was the highest at Rs.5.08 billion during the pre-crisis period. This dropped (insignificantly) to Rs.4.58 billion during the crisis period. During the post-crisis period, there was a significant drop to Rs.3.98 billion. This appears to suggest that the CoVaR might be a lead indicator of a systemic risk indicator, with a

build up of values before the crisis.

We also examine the behaviour of the three measures during the **recent** period (Oct 2011 to Sep 2012), in order to understand whether the systemic vulnerability of Indian firms is as high as (or higher than) during the period of the global financial crisis. If we follow the changes in the values of the three measures in the pre-crisis, crisis and post-crisis, the higher CoVaR value of Rs.5.75 billion in the recent period might be indicative that the systemic risk in the Indian economy is growing.

Since all the above comparisons are based on nominal INR values, we also calculate the summary statistics for each measures as a fraction of GDP.⁷ We find that the median MES/GDP was significantly higher during the crisis and post-crisis period (at 0.13% and 0.14% respectively) compared to the pre-crisis period values of 0.09%. In contrast, even though the CoVaR as a fraction of GDP has decreased over time, these changes were not significantly different.

Our results show that the MES and CoVaR measures rose in response to the higher risk faced by the Indian economy during the crisis period. In particular, the results suggest that the CoVaR may serve as an early warning signal in the event of a crisis.

4.1.2 Anecdotal evidence

Here, we attempt to put together some anecdotal evidence of systemic risk instances using a combination of reports of firms stress in newspapers, or a policy intervention that was likely triggered in response to rising systemic risk.

One such anecdote comes from the ranking of the State Bank of India (SBI) and ICICI Bank in the top SIFs in the quarters of the 2008 crisis. In Oct-Dec 2007, when the first hint of the stress of liquidity in the global money markets came with the bankruptcy of Northern Rock in the U.K., it was widely reported that there was a significant shift of deposits from ICICI Bank to SBI.⁸ This shift in deposits from private sector to public sector banks supports the notion of a 'flight to quality' during systemic crises (Eichengreen and Gupta, 2013).

In the period of Oct-Dec 2007 (which was at the start of the stress in global financial market liquidity) both ICICI Bank and SBI were ranked in the top five SIFs at an aggregate ranking of 81 and 80 respectively (Table B.8 in the Appendix). Over the next four quarters, the gap between the rankings of these two banks widened steadily, ending at 82 and 65 respectively by Oct-Dec 2008 (Table B.12). This improvement in the systemic ranking of SBI while ICICI

⁷These results are not presented here, but are available from the authors on request.

⁸For instance, one of the widely cited cases was that of Infosys transferring their corporate accounts from ICICI Bank to SBI during this period. Source: http://articles.timesofindia.indiatimes.com/2009-01-14/india-business/28032369_1_deposits-foreign-banks-infosys-technologies

Bank remained static could be construed as a consequence of the increased deposits at SBI relative to lower deposits in ICICI Bank.

This suggests that the systemic risk measures and the ranking based on these measures do have a useful role to play in identifying SIFIs and increasing systemic risk.

4.2 SIFs and their systemic risk characteristics

Tables B in the appendix sets out the lists of the largest 50 firms, ranked in order of decreasing systemic importance by their SRI value. There is a significant variation in the ranking by the SRI as well as by the individual measures of the 50 largest firms in each quarter. Figure 1 captures this variation in the form of a box-plot⁹ of the three systemic risk measures – GC, MES and CoVaR – in each quarter from Jan 2000 to Sep 2012.

These plots show that while the interconnectedness measure (GC) has a reasonably consistent distribution in different quarters, there are distinct changes in the distribution for both the MES and the CoVaR at different points during the sample period. Both the average level as well as the dispersion in the MES (measured in Rs.billion) are higher for the 2007-08 period. This has declined substantially during the more recent period. The distribution of CoVaR shows the opposite behaviour with higher dispersion in the more recent quarters of the sample period as compared to the crisis period. This suggests that the overall economic system is more likely to suffer larger losses if firms default due to a systemic shock in 2012 compared to the losses if the default had taken place in 2008.

A caveat is that both the MES and CoVaR are measured in nominal terms. The Indian GDP had doubled within the period of this paper from around Rs.50 trillion during the 2008 crisis to Rs.100 trillion in 2012. Therefore, both these measures need to be adjusted for this growth in GDP.

Figure 2 plots the MES and CoVaR (measured in Rs.billion) in each quarter scaled by the GDP in that quarter, which better depicts the economic relevance of the potential losses that they measure. Here too, the MES (as a fraction of GDP) was at substantially higher levels during the crisis period as opposed to the recent 2012 quarters. No such pattern is present in the CoVaR values, when viewed as a fraction of GDP. The losses of the overall system as a fraction of GDP is the same in 2012 as compared to that in 2008, which implies that the systemic vulnerability of 2012 is the same as that of 2008.

⁹The edges of the box represent the 25th and 75th percentile values for the firms in that quarter.

Figure 1 Temporal and cross-sectional variation in GC, MES, and CoVaR of the top 50 firms, 2000–2012

The graphs below show the box-plots of the GC, MES and CoVaR measures for each quarter. The edges of the box plot represent the 25th and 75th percentile values, while the points outside are the outliers.

GC measures the level of interconnectedness between firms computed as proportion of significant out-connections for firms; MES measures the expected losses of a firm computed as $(\%) \times$ market capitalisation of the firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm default.

The level and the dispersion of the MES measure is higher during the 2007-08 period. The characteristics of the CoVaR measure differs in that it has higher values for the recent period in comparison to the crisis period.

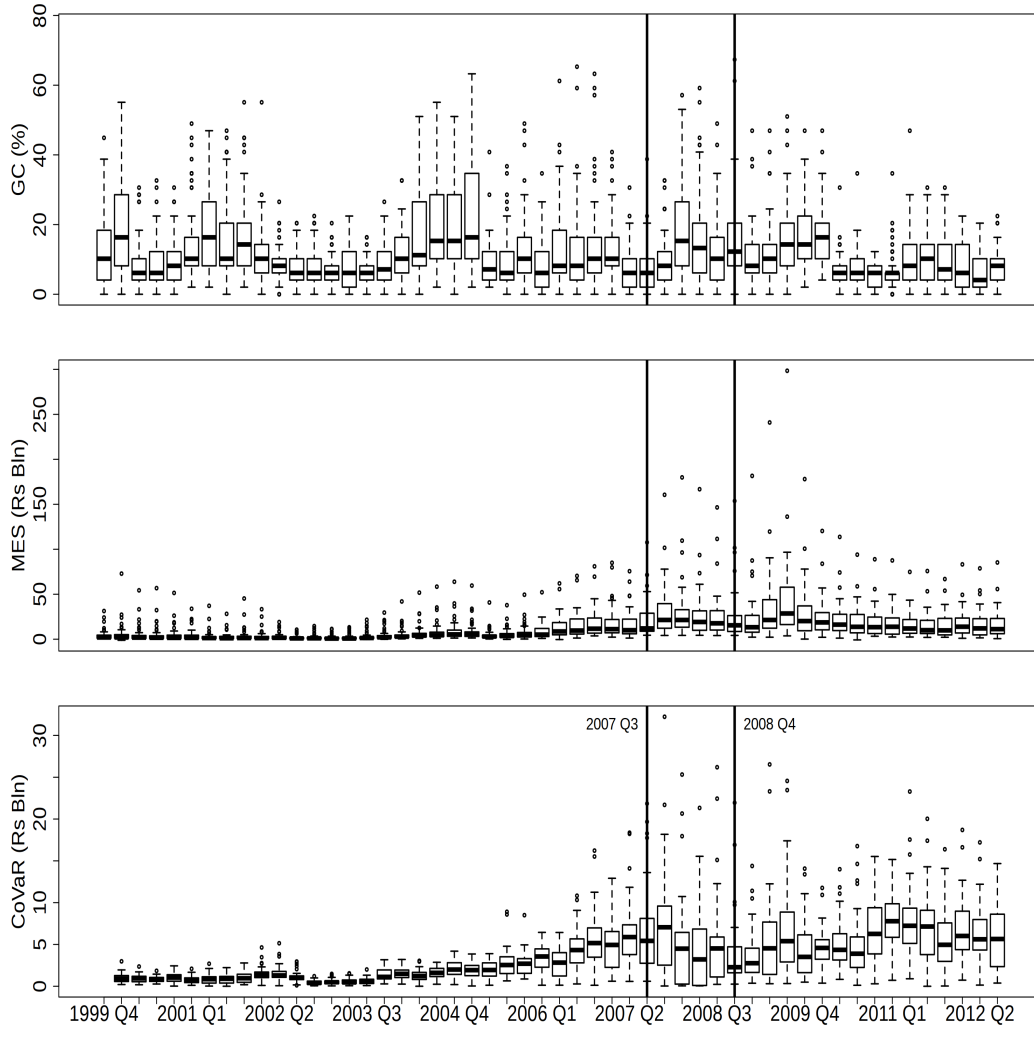
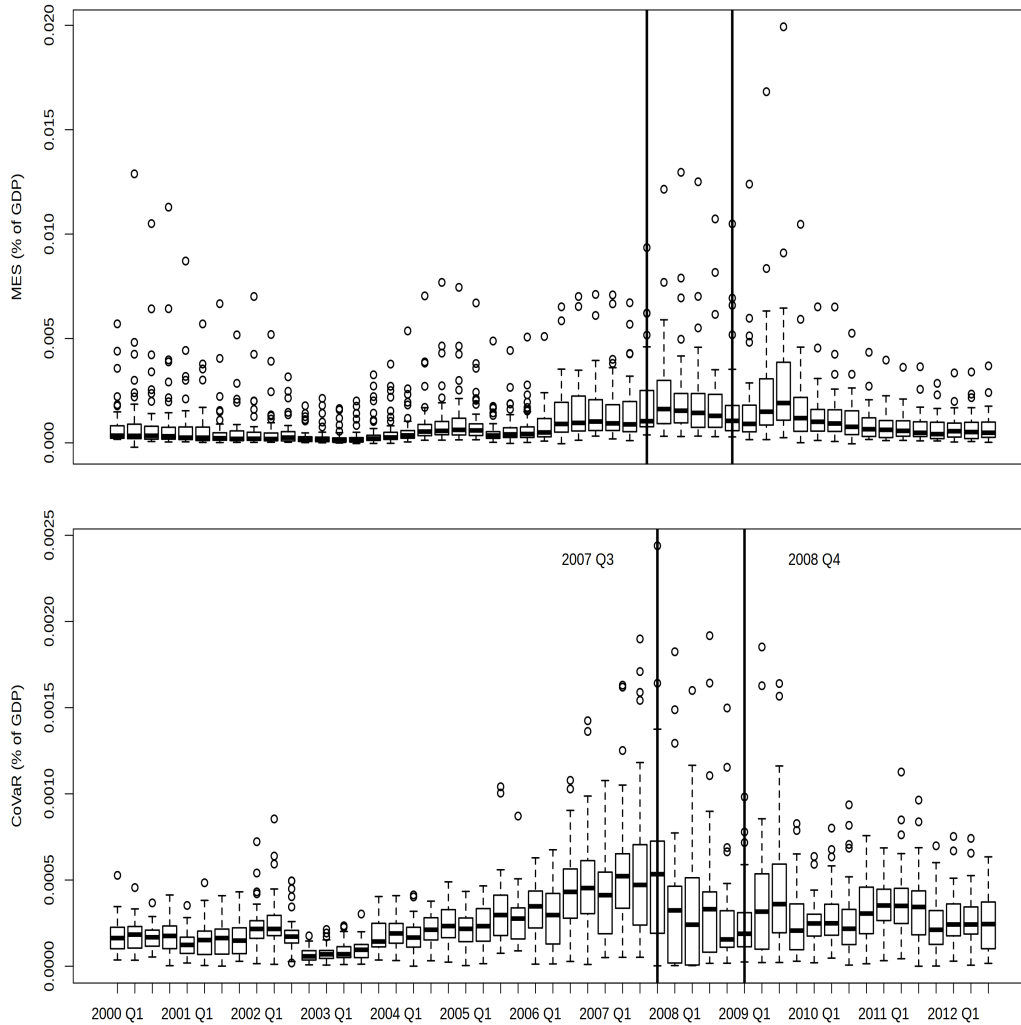


Figure 2 Variation in MES and CoVaR when measured as a fraction of GDP, 2000–2012

The graphs below show the box-plots of the GC, MES and CoVaR measures each quarter, represented as a fraction of GDP. The edges of the box show the 25th and 75th percentile values, and the points outside are the outliers.

GC measures the level of interconnectedness between firms computed as proportion of significant out-connections for firms; MES measures the expected losses of a firm computed as $(\%) \times$ market capitalisation of the firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm default.

As in the case of the graphs of the Rs. value of the measures, the GC and the MES are the highest during the crisis period while the CoVaR takes on the highest values in the period before the crisis.



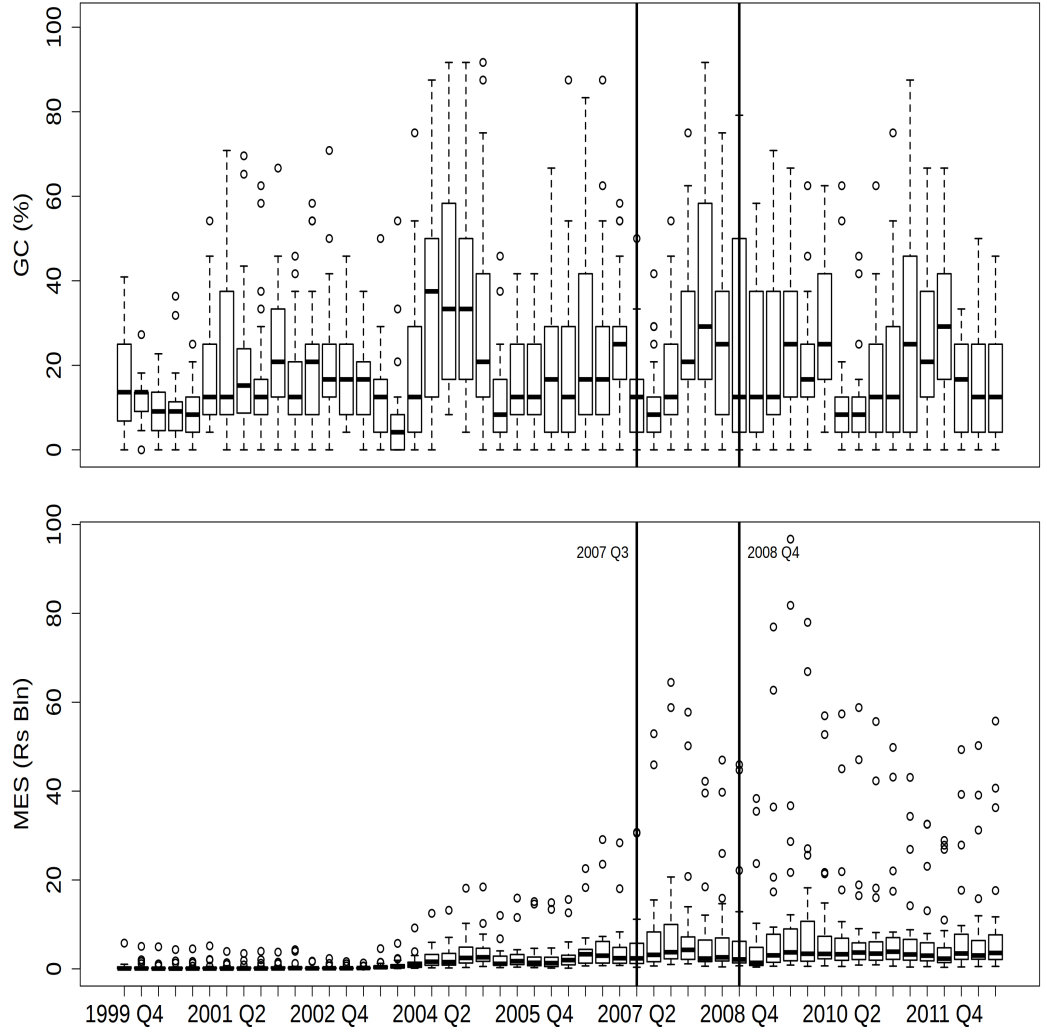
4.3 Systemic risk of Indian banks

A similar analysis is carried out for the GC and MES measures of the 25 largest banks in India. The quarterly time series of the box-plots are computed from Oct 1999 to Sep 2012 and presented in Figure 3.

Figure 3 Temporal dynamics in GC and MES for top 25 banks, 1999–2012

The graphs below show the box-plots of the GC and MES measures for the 25 largest banks by quarter, where the edges of the box show the 25th and 75th percentile values, and the points outside are the outliers.

The GC measures the interconnectedness between banks computed as proportion of significant out-connections for banks. MES measures the expected losses of a bank computed as $(\%) \times \text{market capitalisation of the bank}$.



The time series of the box-plots for the GC measure in Figure 3 shows that the interconnectedness between banks tends to be high. MES (measured in rupee billion) for banks are higher during the 2007-08 period but have marginally

declined in the recent period.

When we compare the summary statistics of the measures for banks to those of the 50 largest firms,¹⁰ we find that the median GC at 16.67% for pre-crisis, crisis, post-crisis, and recent period. This is higher compared to that of the 50 largest firms which ranged between 8-12% in the span of this period. This implies a higher degree of interconnectedness between banks compared to the average firm, which is consistent with our intuition about the importance of the financial sector in systemic risk.

The median MES of these 25 banks is at the highest of Rs.3.15 billion for the crisis period, while that in the set of 50 largest firms is around Rs.27 billion. In part, this reflects the size of the firms in the set of 50 largest firms which is larger than that of the banks. When we examine the MES as a fraction of the GDP, we find that the banking sector had a median value of 0.03% while this was 0.13% for the set of 50 firms. In the recent period, the median banking MES is 0.01% of GDP while it is 0.09% for the 50 largest firms. This implies that the losses posed by the banking sector is likely to be a larger part of the systemic risk during crisis periods compared to periods of low systemic stress.

4.4 Classifying SIFs: SRI vs. single measures

Next, we analyse how the classification of SIFs vary by the systemic risk index (SRI) of the firm compared to their classification by individual measures.

¹⁰The statistics are not reported in the paper separately but can be made available on request.

Table 3 SIFs – before, during and after the 2008 crisis

The table presents the average estimates of GC, MES, CoVaR and SRI for the top five firms. Firms are sorted from highest (most systemically important) to lowest depending on the SRI. The SRI for each firm is computed by taking the average of the percentile rankings across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of default. The market capitalisation of a firm as a % of GDP is also presented.

	SRI	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR
Pre-crisis					
Tata Steel Ltd	77	2.74	9.69	18.60	10.87
I C I C I Bank Ltd	71	7.05	45.92	27.69	8.93
Grasim Industries Ltd	66	2.08	12.75	10.12	7.01
Tata Motors Ltd	66	2.74	7.65	15.32	6.68
Steel Authority Of India Ltd	64	3.79	9.18	24.73	5.22
Crisis					
I C I C I Bank Ltd	78	6.65	28.23	49.04	12.94
Kotak Mahindra Bank Ltd	75	1.83	23.13	13.80	21.82
Reliance Capital Ltd	74	2.50	20.75	27.31	5.47
State Bank Of India	72	7.21	22.11	49.17	18.49
G M R Infrastructure Ltd	69	1.85	13.61	18.25	12.60
Post-crisis					
I C I C I Bank Ltd	80	5.16	24.49	69.00	6.92
State Bank Of India	78	7.53	30.10	65.21	18.81
Steel Authority Of India Ltd	76	4.42	34.69	51.62	4.20
Neyveli Lignite Corpn Ltd	71	1.35	16.84	13.39	11.03
D L F Ltd	65	3.55	12.75	53.83	3.91
Recent					
State Bank Of India	84	5.70	14.29	46.06	16.75
Axis Bank Ltd	82	1.79	13.77	15.53	12.05
I C I C I Bank Ltd	80	4.31	15.82	36.72	8.06
Kotak Mahindra Bank Ltd	72	1.74	13.77	10.50	14.44
Maruti Suzuki India Ltd	67	1.46	18.88	5.94	8.97

The ranking of the firms by their Systemic Risk Index (SRI) measure is reported in Table 3. These rankings are done separately for the four periods defined earlier (pre-crisis, crisis, post-crisis and recent). The firms are ranked by their average SRI values, calculated across the quarters in the period. The average GC, MES and CoVaR values are also reported in order to compare the SRI ranking with the firm's ranking by the individual measures.¹¹

It is important to note that the average SRI in a period, which is the mean of the firm SRI across quarters, can no longer be interpreted as a percentile. Instead, it is a score ranging from zero to hundred. A firm with a high average SRI is one which consistently poses higher systemic risk (in all three measures)

¹¹Estimates of GC, MES, CoVaR, and SRI for individual quarters are separately presented in Tables B.3 - B.20 of the Appendix B.

as opposed to a firm with a lower average SRI. The interpretation of the SRI as a percentile is valid only for that quarter and among the firms in the reference group.

Table 3 shows that ICICI Bank is the most systemically important firm (SIF) during the crisis period, with an average SRI of 78. When we examine the individual risk measures of ICICI Bank, we find that it ranked in the 69th percentile for the GC on average showing that ICICI Bank had a higher degree of interconnectedness than 69% of the firms. It had a higher average loss than 70% of the firms with a ranking in the 70th percentile for the MES measure on average. Lastly, the contribution of ICICI Bank to the of the system was higher than 93% of the firms in the sample, with an average ranking of 93rd percentile for the CoVaR measure.

If we instead rank the firms as SIFs by the individual risk measures, different firms appear as systemically most important. ICICI Bank was systemically most important by interconnectedness (69th percentile rank for GC). However, it was Kotak Mahindra bank that was most systemically important based on the MES. Thus, the aggregation of the various aspects of systemic risk captured by the individual measures into a SRI can be a useful way to capture the overall systemic risk of a firm.

One illustration of the usefulness of an aggregate rather than an individual measure is in the identification of banks as systemically important among the largest 50 Indian firms. The literature often discusses the role of banks as triggers of systemic risk in the FSRs. In our approach of calculating risk measures for the largest 50 firms, this implies that banks ought to have a prominent presence among the highest ranked firms by systemic importance. However, we find that this is not always the case.

For example, if we examine the top 20 SIFs identified by the average GC, MES, CoVaR and SRI ranks, in each of the pre-crisis, crisis, post-crisis and recent periods, the number of financial firms vary across measures. As expected, the largest number of financial firms in the list of top 20 SIFs is seen during the crisis period. There are seven by the GC, CoVaR and the SRI measures and six by the MES measure. In the other periods (pre-crisis, post-crisis), the number of financial firms varies. The GC measure identifies only four firms in these periods while the MES measure identifies three to five, and the CoVaR measure identifies six firms. In contrast, the SRI measure of firms identifies seven financial firms in all periods as among the top 20 SIFs.

When the examine the recent period of the sample, the SRI measure once again identifies seven financial firms in the top 20 SIFs. These same firms are also indentified as SIFs by the GC and MES measures, while the CoVaR identifies six firms. The consistent presence of the financial firms across both the individual risk measures as well as the SRI suggests that the risk in the financial sector is similar to that of the crisis period.

4.5 Should the systemic risk of non-financial firms be monitored?

Non-financial firms may also act as vectors of systemic risk. They may pose a threat to the stability of the system and may require policy interventions. A case in point that has been frequently referred to is the case of the liquidity crisis faced by the Indian real-estate sector during the 2008 global financial crisis, and their adverse impact on the health of the Indian banking sector.

The real-estate sector, which has traditionally been composed of privately held firms, started accessing the public market place in the decade of 2000. This facilitates the calculation of systemic risk measures for the firms that are listed and whose balance sheet information is available in the Prowess database. During the peak of the 2008 financial crisis, real estate firms faced tight liquidity conditions and there was a danger of large scale defaults to the banks, who in turn faced the probability of a significant increase in the level of their non-performing assets. As a consequence, there was a special regulatory treatment provided for commercial real estate exposures of banks in August 2008, where loans to real estate firms were made temporarily eligible for corporate debt restructuring.¹²

When we examine the quarterly lists of SIFs starting from Jul-Sep 2008, (Table B.10 in the Appendix), we find that DLF (a real-estate firm with an average market capitalisation that is under 4% as a fraction of GDP) is ranked among the top 15 SIFs. DLF had a SRI of 61 for both 2008 Q3 and Q4. The SRI went up to 69 in 2009 Q1, where it was ranked as the 6th firm among the top 20 SIFs. We may infer that DLF had become systemically more important during the crisis period. The data also shows that it remained one of the more systemically risky firms even during the post-crisis period, ranked 5th highest among the top 20 SIFs, with an average SRI of 65.

If we examine the systemic importance of DLF by the individual risk measures, we find that DLF ranked in the 45th percentile for the GC measure (interconnectedness of 12.75%), the 94th percentile by MES (Rs.53.83 billion expected loss) and the 56th percentile for the CoVaR measure (an expected loss of Rs.3.91 billion to the system).

We compare these values for DLF against those of HDFC Bank, which had a similar average market capitalisation that was a little over 4% as a fraction of GDP. HDFC Bank was the 7th most SIF in the post-crisis period with an average SRI of 59, which was lower than the SRI value and ranking of DLF. While HDFC Bank had a higher ranking by the GC measure than DLF (higher interconnectedness of 14.26%), the MES rank was lower (rank of 50% mapping to Rs.30.97 billion of expected loss). However, the CoVaR measure was Rs.9.27 billion. Thus, in that period, DLF itself presented a higher loss to

¹²Source: <http://rbidocs.rbi.org.in/rdocs/notification/PDFs/88917.pdf>

the economy (higher MES than HDFC), but the bank was more interconnected and had a higher systemic impact compared with a similar sized real-estate company.

A comparison of the CoVaR between a non-financial and financial firm has an inherent conceptual flaw in that the measures of the financial firm will have some exposure to the risk of the non-financial firm. Thus, a direct comparison of specific measures like the CoVaR for a bank and a manufacturing firm cannot be made. The SRI for the firm fares better as a comparative tool since it only gives partial weight to the three measures. Thus, we can argue that the SRI is a useful measure to capture the comprehensive systemic role a firm plays in the systemic risk. The average SRI introduced and analysed in this section enables the comparison of SIFs over chosen periods of time, particularly when comparing the systemic importance of financial and non-financial firms.

The analysis can also be done for other sectors where the banking sector has a significant exposure. For instance, during the crisis period, GMR Infrastructure has a ranking of 5th amongst the list of top 20 SIFs. With the large number of infrastructure firms that report quarterly financials and have their shares listed and actively traded on stock exchanges, it is relatively simple to set up a monitoring process of their systemic risk measures each quarter. Even though, the regulatory and the political focus tends to be on the banks, including monitoring systems for firms and sectors where the banks have a concentrated exposure may well serve as early warning indicators for the build up of shocks, both in individual banks as well as the banking sector as a whole.

5 Conclusion

In this paper, we measure systemic risk of a given firm at a given point in time using three measures of systemic risk: GC, MES, CoVaR. We then aggregate these measures to create a single measure of systemic risk for the firm (the SRI), which is computed by averaging the percentile rankings across the three individual measures of systemic risk. The measures are computed for the 50 largest firms in the country, by market capitalisation, between 2000 and 2012. The set of firms include both financial and non-financial firms.

The results include the identities of the 20 most systemically important firms in the country each quarter, when ranked by their Systemic Risk Index (SRI) which is an aggregation of the three individual risk measures for the firm. Along with the identities of the firms, we also report the aggregate loss to the system if these firms were to fail. In the analysis, we present a time series performance analysis of the measures and the SRI rankings of the firms around the period of the 2008 financial crisis. We also present some anecdotal evidence of specific firms and sectors that were reported to be under stress at various times, and whether they appear to be SIFs as expected.

There are several extensions that are possible from this work. In the paper, we restrict the measurement and classification of SIFs to the 50 largest firms in the country. An extension of the sample to cover a larger set of firms would help understand the systemic importance of firms that are relatively smaller in terms of market capitalisation. These measures and the SRI can be used to identify SIFs in different industry sectors. If these sectors have a concentration in the loan portfolio of the banking sector at any given point in time, it could serve as a useful input into better risk management for both the financial firm as well as the regulator who is monitoring and managing systemic risk.

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A Appendix

A Systemic risk measures used globally

Table A.1 Systemic risk measures from Financial Stability Reports

	Measure	Area of risk
U.K.	Systemic risk survey	Global and domestic
From 1996	Implied default probability of sovereign debt, credit ratings	Macroeconomic
Bi-annual	Market based capital ratios, funding costs, pre-tax profit, P-B ratio, Credit conditions survey	Banking sector
	Implied probability densities	Financial markets
	Stress test	Resilience of banks
Sweden	Systemic risk survey, European stress index	Global and domestic
From 1997	Credit gap, expected default frequencies, loan losses	Macroeconomic
Bi-annual	Counterparty exposures	Banking sector
	Stress test	Resilience of the top 4 banks
Australia	Exposure to euro banks, credit growth, NPA and impaired assets, capital ratio	Banking sector
From 2004	Indebtedness, non-performing housing loans	Household sector
Bi-annual	ROE, AUM	Insurance and managed funds
ECB	ECB survey of professional forecasters, global spillover index, sovereign CDS	Macroeconomic
From 2004	Indebtedness, interest rates, unemployment rates	Household sector
Bi-annual	Default probability	Corporate sector
	Joint default risk of large, complex banking groups in the euro area, spreads between LIBOR and OIS	Banking sector
	Option implied probability densities	financial markets
	Stress tests	Resilience of banks and insurers
New Zealand	Financial stability cobweb	Financial sector
From 2004	World GDP growth, gross government debt, terms of trade, trade weighted index	Macroeconomic
Bi-annual	Debt-to-income ratio, housing price index	Household sector
	Farm price index, farm-price-to-agriexports ratio, dairy sector indebtedness	Agricultural sector
	Capital adequacy ratios, asset quality, ROA, funding composition, Credit conditions survey	Banking sector
	Stress test	Resilience of banks
India	Systemic risk survey	Global and domestic
From 2010	Macroeconomic stability map	Macroeconomic
Bi-annual	Systemic liquidity index, Stability map	Financial market
	Stability map and measures, network analysis	Banking sector
	Stress test	Resilience of banks

Table A.2 Benchmark systemic risk toolkit measures

The OFR toolkit

Costly Asset-Price Boom/Bust Cycles, Property-Price, Equity-price, Credit Gap Indicators, Macroprudential Regulation, Default Intensity Model, Network Analysis and Systemic Financial Linkages, Simulating a Credit Scenario, Simulating a Credit-and-Funding-Shock Scenario, Granger-Causality, Bank Funding Risk and Shock Transmission, Mark-to-Market Accounting and Liquidity Pricing, Contingent Claims Analysis, Mahalanobis Distance, Multivariate Density Estimators, Simulating the Housing Sector, Consumer Credit, Principal Component Analysis, GDP Stress Tests, Lessons from the SCAP, A 10-by-10-by-10 Approach, CoVaR, Distressed Insurance Premium, Co-Risk, Marginal and Systemic Expected Shortfall, Risk Topography, The leverage Cycle, Noise as Information for Illiquidity, Crowded Trades in Currency Funds, Equity Market Illiquidity, Serial Correlation and Illiquidity in Hedge Fund returns, Broader Hedge-Fund-Based Systemic Risk Measures

4 macroeconomic and 27 market measures, of which 6 can be readily calculated for India

The IMF toolkit

CoVaR, Joint Distress indicators, Returns Spillover, Distress Spillovers, Market-Based Probability of Default, Debt Sustainability, Indicators of Fiscal Stress, Sovereign Funding Shock Scenarios, Asset Price Models, Balance Sheet Approach, Systemic Contingent Claims, Cross-Border Interconnectedness, Cross-Border Network Contagion, Systemic Liquidity Risk Indicator, HEAT, Thresholds Model, Macro Stress Tests, GDP at Risk, CredittoGDP-Based Crisis Prediction Model, Crisis Prediction Model, DSGE Model

7 macroeconomic and 16 market measures, of which 9 can be readily calculated for India.

B Classification of 50 largest firms by decreasing systemic risk

Table B.3 SIFs, in 2006 Q3

The table presents the estimates of GC, MES, CoVaR, and the SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.10041.55 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
Tata Steel Ltd	85	3.10	8.16	22.51	10.83
Kotak Mahindra Bank Ltd	80	1.08	10.20	5.69	9.08
S A I L	77	3.21	8.16	20.44	5.68
Grasim Ind. Ltd	76	2.30	16.33	11.04	5.66
N A L C O	76	1.36	22.45	8.22	*
Sterlite Ind. India Ltd	74	2.43	12.24	21.87	*
I T C Ltd	73	7.02	14.29	31.46	5.77
Tata Comms. Ltd	73	1.13	12.24	7.71	*
Tata Motors Ltd	71	3.29	6.12	17.73	5.92
I C I C I Bank Ltd	69	6.22	65.31	22.57	5.44
Mahindra Mahindra Ltd	69	1.65	14.29	6.54	6.32
Indian Oil Corpn Ltd	67	6.08	36.73	22.75	4.64
Satyam Computer Services Ltd	67	2.67	34.69	9.89	5.04
Larsen Toubro Ltd	61	3.55	8.16	16.78	*
Ultratech Cement Ltd	61	1.11	28.57	3.74	5.62
Hero Motocorp Ltd	59	1.54	10.20	5.28	6.17
A C C Ltd	58	1.85	32.65	7.78	2.84
Hindalco Ind. Ltd	56	1.98	10.20	11.98	0.63
O F S S	56	1.16	16.33	5.83	0.69
B H E L	55	5.85	20.41	27.70	0.00
Oil Natural Gas Corpn Ltd	55	16.61	4.08	70.39	5.06
State Bank Of India	55	5.39	6.12	18.31	10.33
Wipro Ltd	55	7.50	4.08	31.62	5.09
Z E E L	54	1.26	30.61	3.57	4.61
Canara Bank	53	1.16	4.08	6.82	3.58
Maruti Suzuki India Ltd	53	2.82	6.12	13.86	3.52
Reliance Ind. Ltd	52	16.26	2.04	65.58	7.30
H D F C Ltd	51	3.81	4.08	16.84	3.97
Ambuja Cements Ltd	49	1.58	59.18	5.73	1.00
Cipla Ltd	49	2.03	8.16	8.75	2.64
Hindustan Unilever Ltd	49	5.65	4.08	26.11	3.74
N T P C Ltd	49	10.68	16.33	34.95	*
Reliance Capital Ltd	49	1.27	4.08	8.65	0.69
Punjab National Bank	48	1.65	8.16	6.51	3.68
Siemens Ltd	47	1.80	6.12	10.36	0.28
Bajaj Holdings Invst Ltd	45	3.02	0.00	13.61	4.03
Bharat Petro. Corpn Ltd	42	1.32	18.37	4.79	0.00
Container Corpn Of India Ltd	41	1.09	10.20	2.61	*
Infosys Ltd	38	10.20	4.08	33.39	4.33
A B B Ltd	36	1.23	4.08	5.18	1.61
Tata Consultancy Services Ltd	35	9.96	8.16	34.13	1.55
Bharti Airtel Ltd	33	8.86	4.08	31.20	3.39
Unitech Ltd	33	2.69	0.00	1.26	6.23
Sun Pharm. Inds Ltd	30	1.73	2.04	4.21	4.65
H D F C Bank Ltd	29	2.90	6.12	6.96	3.14
Dr Reddy S Labs. Ltd	26	1.12	4.08	3.53	2.75
G A I L India Ltd	24	2.22	0.00	9.32	0.00
H C L Tech. Ltd	23	1.78	6.12	5.60	0.00
Ranbaxy Labs. Ltd	23	1.63	2.04	5.72	2.10
Tata Power Co Ltd	20	1.12	0.00	4.34	0.00

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.4 SIFs, 2006 Q4

The table presents the estimates of GC, MES, CoVaR, and the SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.11393.13 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
Tata Steel Ltd	75	2.46	8.16	19.61	11.25
Grasim Ind. Ltd	74	2.25	18.37	13.32	6.85
S A I L	71	3.23	16.33	23.51	5.19
Kotak Mahindra Bank Ltd	70	1.14	10.20	6.74	10.75
I C I C I Bank Ltd	69	6.99	57.14	29.10	8.00
Indian Oil Corp'n Ltd	67	4.61	36.73	21.63	5.64
Hindalco Ind. Ltd	64	1.77	6.12	11.85	9.29
Sterlite Ind. India Ltd	64	2.66	10.20	26.57	*
A C C Ltd	63	1.79	38.78	8.93	4.87
N A L C O	63	1.21	12.24	8.03	*
Bajaj Holdings Invst Ltd	62	2.33	8.16	11.85	10.44
I T C Ltd	61	5.81	12.24	29.84	6.30
Mahindra Mahindra Ltd	61	1.95	24.49	8.92	5.21
Punjab National Bank	61	1.40	18.37	6.65	6.13
Z E E L	60	1.12	59.18	3.70	7.11
Tata Motors Ltd	59	3.04	6.12	17.57	7.17
Satyam Computer Services Ltd	56	2.79	34.69	11.57	4.96
Reliance Capital Ltd	55	1.19	12.24	9.34	2.84
Suzlon Energy Ltd	55	3.30	4.08	27.92	*
Hero Motocorp Ltd	52	1.34	12.24	5.60	6.59
H D F C Ltd	52	3.57	8.16	18.87	5.17
Axis Bank Ltd	51	1.16	2.04	5.37	15.52
B H E L	51	4.94	26.53	26.94	1.36
Reliance Ind. Ltd	51	15.54	4.08	69.53	16.23
O F S S	49	1.39	18.37	7.90	1.66
H D F C Bank Ltd	47	2.95	12.24	7.29	8.24
Jaiprakash Associates Ltd	47	1.38	6.12	9.57	4.56
Larsen Toubro Ltd	47	3.56	6.12	19.00	*
N T P C Ltd	47	9.88	12.24	37.79	6.70
State Bank Of India	47	5.75	8.16	23.55	7.14
Ambuja Cements Ltd	46	1.88	63.27	7.69	2.36
Ultratech Cement Ltd	45	1.20	32.65	4.63	4.65
Oil Natural Gas Corp'n Ltd	43	16.36	8.16	81.00	4.77
Siemens Ltd	43	1.68	10.20	11.72	0.00
A B B Ltd	41	1.38	10.20	7.64	1.81
Wipro Ltd	41	7.65	10.20	36.38	3.89
Maruti Suzuki India Ltd	40	2.36	6.12	13.08	3.65
Bharti Airtel Ltd	38	10.48	4.08	44.98	5.35
Hindustan Unilever Ltd	35	4.19	6.12	21.21	3.49
Cipla Ltd	29	1.71	6.12	7.76	3.46
Container Corp'n Of India Ltd	27	1.21	6.12	3.67	*
Dr Reddy S Labs. Ltd	27	1.19	2.04	4.03	5.20
Bharat Petro. Corp'n Ltd	26	1.07	10.20	4.57	0.12
G A I L India Ltd	26	1.94	6.12	8.57	2.58
Tata Consultancy Services Ltd	22	10.50	8.16	41.56	1.76
H C L Tech. Ltd	19	1.83	10.20	6.68	0.00
Infosys Ltd	19	10.94	4.08	38.78	3.98
Ranbaxy Labs. Ltd	16	1.28	2.04	5.17	2.32
Unitech Ltd	15	3.28	0.00	4.35	4.86
Sun Pharm. Inds Ltd	13	1.64	6.12	4.57	2.34

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.5 SIFs, 2007 Q1

The table presents the estimates of GC, MES, CoVaR, and the SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.11989.77 billion.

Firms	SRI	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
I C I C I Bank Ltd	71	6.40	40.82	28.37	8.16
Tata Steel Ltd	71	2.18	8.16	18.64	9.57
S A I L	69	3.94	12.24	32.81	4.94
Sterlite Ind. India Ltd	69	2.19	10.20	21.92	*
N A L C O	67	1.26	14.29	9.17	*
Tata Comms. Ltd	67	0.96	12.24	7.46	*
Grasim Ind. Ltd	63	1.60	12.24	8.40	7.65
Kotak Mahindra Bank Ltd	63	1.30	6.12	8.33	12.12
Hindalco Ind. Ltd	61	1.26	8.16	8.57	6.99
Larsen Toubro Ltd	61	3.83	12.24	23.27	*
Indian Oil Corpn Ltd	60	3.89	36.73	17.24	5.37
Reliance Comms. Ltd	60	7.18	12.24	43.16	*
Jaiprakash Associates Ltd	59	0.98	10.20	7.94	4.29
Tata Motors Ltd	58	2.34	8.16	15.04	6.37
Reliance Capital Ltd	57	1.37	16.33	11.85	1.18
Bajaj Holdings Invst Ltd	56	2.05	8.16	11.00	7.76
Bharat Electronics Ltd	56	1.00	6.12	7.04	5.37
H D F C Bank Ltd	56	2.54	24.49	7.10	7.05
Mahindra Mahindra Ltd	56	1.60	38.78	8.67	1.51
Hero Motocorp Ltd	55	1.15	18.37	4.39	7.31
I T C Ltd	55	4.74	16.33	21.52	5.97
Maruti Suzuki India Ltd	55	1.98	8.16	13.10	5.19
Satyam Computer Services Ltd	55	2.61	32.65	13.11	4.30
A C C Ltd	54	1.15	26.53	5.98	4.13
Suzlon Energy Ltd	54	2.40	2.04	20.37	*
Reliance Ind. Ltd	53	15.93	8.16	79.86	12.92
Wipro Ltd	52	6.80	6.12	40.42	6.16
H D F C Ltd	51	3.21	4.08	17.16	7.53
Punjab National Bank	51	1.25	28.57	6.20	3.89
B H E L	50	4.62	22.45	24.29	1.97
O F S S	50	1.45	20.41	8.74	0.87
Siemens Ltd	46	1.53	10.20	11.38	0.00
A B B Ltd	45	1.25	12.24	6.88	1.72
Cipla Ltd	45	1.54	16.33	7.79	3.33
Axis Bank Ltd	43	1.15	0.00	6.36	4.51
Bharti Airtel Ltd	41	12.08	10.20	47.97	4.95
Container Corpn Of India Ltd	41	1.06	10.20	4.41	*
Oil Natural Gas Corpn Ltd	41	15.71	8.16	84.98	4.47
Ambuja Cements Ltd	39	1.35	28.57	5.82	1.51
State Bank Of India	38	4.37	8.16	18.04	6.51
N T P C Ltd	37	10.33	8.16	40.81	6.55
Hindustan Unilever Ltd	33	3.78	8.16	20.33	1.89
Infosys Ltd	25	9.39	8.16	41.45	3.72
Unitech Ltd	25	2.62	0.00	2.27	5.02
G A I L India Ltd	24	1.87	2.04	9.83	1.38
Tata Consultancy Services Ltd	23	10.07	8.16	45.66	1.80
Dr Reddy S Labs. Ltd	20	1.02	0.00	4.45	3.86
H C L Tech. Ltd	19	1.60	8.16	7.49	0.00
Ranbaxy Labs. Ltd	17	1.09	2.04	5.36	0.60
Sun Pharm. Inds Ltd	13	1.70	0.00	5.40	2.26

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.6 SIFs, 2007 Q2

The table presents the estimates of GC, MES, CoVaR, and the SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.11264.81 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
I D F C Ltd	84	1.32	30.61	7.49	*
Suzlon Energy Ltd	80	3.82	16.33	22.31	*
Tata Steel Ltd	78	3.23	14.29	13.64	11.84
I C I C I Bank Ltd	74	8.58	20.41	30.73	14.10
Tata Motors Ltd	74	2.29	10.20	10.95	7.27
State Bank Of India	72	7.13	10.20	30.54	8.59
Jaiprakash Associates Ltd	69	1.44	12.24	6.03	7.26
Punjab National Bank	69	1.51	22.45	7.28	5.18
Reliance Ind. Ltd	66	21.04	10.20	75.60	18.24
Bharti Airtel Ltd	65	14.08	16.33	48.26	7.38
Maruti Suzuki India Ltd	64	1.91	18.37	8.48	5.45
H D F C Bank Ltd	62	3.39	12.24	11.16	9.65
Oil Natural Gas Corpn Ltd	62	17.19	14.29	63.99	5.74
Reliance Comms. Ltd	60	9.39	4.08	48.01	*
Reliance Capital Ltd	58	2.37	10.20	12.74	1.78
Sun T V Network Ltd	58	1.39	4.08	6.75	*
Unitech Ltd	58	3.64	6.12	15.43	6.58
Bajaj Holdings Invst Ltd	57	1.92	8.16	6.03	11.73
B H E L	57	6.68	6.12	25.12	7.32
Mahindra Mahindra Ltd	56	1.58	6.12	7.97	5.44
Sterlite Ind. India Ltd	56	3.68	0.00	18.92	*
Axis Bank Ltd	55	1.52	8.16	6.92	5.25
H D F C Ltd	54	4.57	4.08	16.78	8.50
Larsen Toubro Ltd	53	5.54	6.12	22.38	*
Hindalco Ind. Ltd	52	1.74	6.12	8.49	3.94
Wipro Ltd	52	6.72	0.00	30.99	6.14
Grasim Ind. Ltd	51	2.15	4.08	7.74	7.87
Siemens Ltd	47	2.09	8.16	9.81	0.00
A C C Ltd	45	1.56	6.12	6.93	2.93
Satyam Computer Services Ltd	45	2.77	2.04	10.17	6.48
Kotak Mahindra Bank Ltd	43	1.95	0.00	5.55	18.37
N A L C O	42	1.50	0.00	5.72	*
N T P C Ltd	41	11.18	2.04	35.99	7.07
Reliance Infra. Ltd	41	1.24	6.12	4.82	4.86
S A I L	41	4.80	0.00	22.17	5.08
Tata Consultancy Services Ltd	41	9.98	0.00	34.60	6.79
H C L Tech. Ltd	39	2.03	6.12	9.03	0.00
I T C Ltd	39	5.17	4.08	15.18	6.78
Bharat Electronics Ltd	38	1.30	0.00	5.13	5.58
Indian Oil Corpn Ltd	37	4.70	2.04	15.25	6.03
Container Corpn Of India Ltd	35	1.35	6.12	2.28	*
O F S S	35	1.93	20.41	3.97	0.58
A B B Ltd	27	2.06	4.08	7.51	1.56
Cipla Ltd	27	1.44	6.12	4.16	3.64
G A I L India Ltd	27	2.33	8.16	3.95	1.97
Infosys Ltd	25	9.78	0.00	30.23	5.56
Ambuja Cements Ltd	24	1.68	2.04	5.81	1.63
Hindustan Unilever Ltd	22	3.70	4.08	12.37	1.29
Sun Pharm. Inds Ltd	20	1.79	4.08	4.83	2.63
Bosch Ltd	13	1.28	2.04	1.22	1.59

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.7 SIFs, 2007 Q3

The table presents the estimates of GC, MES, CoVaR, and SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.11508.04 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
Punjab National Bank	78	1.49	10.20	8.30	9.36
State Bank Of India	77	8.90	14.29	45.92	10.03
Tata Steel Ltd	75	4.50	10.20	25.16	7.03
Reliance Comms. Ltd	71	10.42	12.24	59.41	*
Tata Motors Ltd	71	2.60	14.29	12.26	10.58
G M R Infra. Ltd	69	2.50	8.16	18.97	*
I C I C I Bank Ltd	68	10.26	6.12	52.92	18.28
Reliance Capital Ltd	67	3.38	12.24	23.27	4.81
Bharti Airtel Ltd	66	15.50	20.41	71.54	5.88
I D F C Ltd	66	1.59	6.12	11.04	6.02
Unitech Ltd	66	4.34	2.04	27.18	8.81
Kotak Mahindra Bank Ltd	59	2.62	4.08	11.64	19.67
Sterlite Ind. India Ltd	59	4.61	6.12	25.34	*
Axis Bank Ltd	58	2.37	8.16	11.11	6.85
Suzlon Energy Ltd	57	3.63	4.08	19.94	*
Maruti Suzuki India Ltd	56	2.51	10.20	10.35	6.44
Jaiprakash Associates Ltd	53	2.09	12.24	10.54	3.63
Oil Natural Gas Corpn Ltd	53	17.81	12.24	71.41	5.71
Reliance Ind. Ltd	53	27.83	4.08	107.63	21.85
Grasim Ind. Ltd	51	2.80	8.16	10.62	7.75
Reliance Infra. Ltd	51	2.39	16.33	10.95	2.75
H D F C Bank Ltd	50	4.41	6.12	15.51	17.75
S A I L	50	7.43	10.20	36.45	4.20
H D F C Ltd	49	5.97	4.08	23.75	8.71
Mahindra Mahindra Ltd	49	1.60	10.20	8.21	2.00
B H E L	46	8.66	6.12	38.47	5.43
N A L C O	46	1.69	14.29	5.08	*
United Spirits Ltd	46	1.50	4.08	7.52	4.76
Bajaj Holdings Invst Ltd	45	2.23	2.04	7.90	13.60
Ranbaxy Labs. Ltd	45	1.41	38.78	5.80	0.60
N T P C Ltd	44	13.90	4.08	46.25	8.12
Neyveli Lignite Corpn Ltd	43	1.54	6.12	8.48	0.81
Tech Mahindra Ltd	43	1.41	0.00	6.55	*
Tata Consultancy Services Ltd	42	9.02	0.00	35.65	7.44
Hindalco Ind. Ltd	41	1.84	2.04	9.87	2.57
Larsen Toubro Ltd	40	7.00	2.04	30.42	*
A C C Ltd	39	1.95	0.00	9.72	4.75
Tata Power Co Ltd	36	1.54	22.45	4.51	1.39
Siemens Ltd	35	1.98	2.04	10.83	0.00
Wipro Ltd	34	5.84	0.00	29.02	2.26
A B B Ltd	33	2.39	2.04	11.55	2.06
Sun Pharm. Inds Ltd	33	1.67	6.12	4.39	5.03
H C L Tech. Ltd	31	1.73	0.00	8.88	0.00
I T C Ltd	31	6.21	0.00	14.43	6.73
Satyam Computer Services Ltd	29	2.59	0.00	10.10	4.76
Infosys Ltd	23	9.39	0.00	28.87	4.75
Hindustan Unilever Ltd	21	4.23	4.08	13.42	1.50
Indian Oil Corpn Ltd	21	4.87	0.00	14.70	4.55
Ambuja Cements Ltd	18	1.91	4.08	5.01	1.72
G A I L India Ltd	10	2.79	2.04	6.16	0.70

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.8 SIFs, 2007 Q4

The table presents the estimates of GC, MES, CoVaR, and SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.13216.48 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
I C I C I Bank Ltd	81	10.43	24.49	64.46	21.70
Reliance Capital Ltd	80	4.81	18.37	43.16	8.56
State Bank Of India	80	9.44	24.49	58.80	14.93
Indiabulls Financial Services Ltd	79	1.69	14.29	15.97	9.30
Tata Steel Ltd	75	5.17	14.29	36.55	10.48
H D F C Ltd	63	6.13	18.37	29.43	10.89
Sterlite Ind. India Ltd	63	5.55	12.24	39.65	*
Bharti Airtel Ltd	61	14.31	10.20	74.37	11.51
Kotak Mahindra Bank Ltd	61	3.38	6.12	20.68	32.23
Reliance Comms. Ltd	59	11.65	10.20	75.19	*
S A I L	59	8.89	10.20	64.59	6.16
I D F C Ltd	58	2.24	6.12	17.68	7.11
Oil Natural Gas Corpn Ltd	58	20.02	18.37	101.60	6.52
Larsen Toubro Ltd	57	9.20	14.29	50.62	*
Maruti Suzuki India Ltd	56	2.17	8.16	11.30	12.01
Unitech Ltd	56	6.01	2.04	39.55	9.48
B H E L	55	9.59	10.20	56.87	7.00
Tata Motors Ltd	55	2.16	6.12	12.35	13.15
G M R Infra. Ltd	54	3.42	2.04	29.64	*
Reliance Infra. Ltd	54	3.82	30.61	24.32	0.00
H D F C Bank Ltd	50	4.63	8.16	19.87	18.17
Hindalco Ind. Ltd	49	1.99	8.16	14.15	3.63
A B B Ltd	47	2.42	24.49	12.18	1.25
M R P L	47	1.81	4.08	10.89	7.01
Axis Bank Ltd	44	2.62	6.12	12.71	9.59
Jaiprakash Associates Ltd	44	3.75	4.08	24.87	4.44
Hindustan Zinc Ltd	42	2.64	6.12	14.37	*
Adani Enterprises Ltd	41	2.14	32.65	10.38	0.00
Suzlon Energy Ltd	41	4.39	2.04	33.86	0.13
Siemens Ltd	40	2.41	10.20	14.35	0.00
Neyveli Lignite Corpn Ltd	39	3.27	6.12	24.76	0.00
Tata Consultancy Services Ltd	39	7.98	6.12	32.37	9.25
Infosys Ltd	37	7.65	8.16	26.09	8.64
Jindal Steel Power Ltd	36	3.59	8.16	22.13	0.00
Tata Power Co Ltd	36	2.43	32.65	8.52	0.04
Essar Oil Ltd	35	2.81	10.20	13.85	0.13
Grasim Ind. Ltd	35	2.54	6.12	9.22	8.58
Reliance Ind. Ltd	35	31.71	10.20	160.56	0.09
Satyam Computer Services Ltd	35	2.29	4.08	9.01	8.35
N A L C O	33	2.36	4.08	10.39	*
Wipro Ltd	33	5.81	4.08	30.54	2.53
Indian Oil Corpn Ltd	31	7.17	0.00	27.07	7.54
H C L Tech. Ltd	25	1.66	4.08	8.48	0.03
G A I L India Ltd	24	3.48	8.16	12.97	1.01
Bajaj Holdings Invst Ltd	21	2.01	0.00	7.30	5.41
N T P C Ltd	21	15.65	4.08	77.91	0.00
Sun Pharm. Inds Ltd	20	1.83	6.12	4.16	5.83
I T C Ltd	19	5.97	6.12	15.52	4.04
Hindustan Unilever Ltd	15	3.52	0.00	10.79	1.58
Ambuja Cements Ltd	12	1.69	0.00	4.28	0.25

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.9 SIFs, 2008 Q1

The table presents the estimates of GC, MES, CoVaR, and SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.13881.57 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
Reliance Capital Ltd	83	2.17	32.65	31.91	7.03
Kotak Mahindra Bank Ltd	81	1.55	38.78	13.98	17.95
I C I C I Bank Ltd	79	6.17	44.90	50.19	10.73
Jaiprakash Associates Ltd	75	1.91	22.45	23.69	5.26
State Bank Of India	75	7.28	34.69	57.77	25.32
Neyveli Lignite Corpn Ltd	69	1.45	30.61	21.79	3.04
G M R Infra. Ltd	68	1.95	22.45	22.50	*
Unitech Ltd	68	3.23	12.24	36.13	10.63
I D F C Ltd	67	1.41	14.29	14.54	7.81
S A I L	67	5.51	20.41	56.22	5.04
H D F C Bank Ltd	65	3.40	26.53	20.80	20.66
Hindustan Zinc Ltd	64	1.60	32.65	13.42	*
Hindalco Ind. Ltd	63	1.46	16.33	14.73	5.47
Cairn India Ltd	60	2.87	40.82	20.94	*
Bharti Airtel Ltd	59	11.30	30.61	56.28	8.41
Idea Cellular Ltd	59	1.95	26.53	15.59	*
Indian Oil Corpn Ltd	57	3.83	14.29	32.07	5.60
Sterlite Ind. India Ltd	56	3.65	16.33	32.84	*
Axis Bank Ltd	55	2.04	18.37	13.30	7.55
Power Finance Corpn Ltd	54	1.34	12.24	13.15	*
Oil Natural Gas Corpn Ltd	51	15.11	14.29	109.59	6.01
B H E L	50	7.27	10.20	56.12	6.33
H D F C Ltd	48	4.87	30.61	36.51	0.31
Jindal Steel Power Ltd	47	2.30	16.33	28.00	0.12
Essar Oil Ltd	46	1.73	14.29	26.53	0.00
Suzlon Energy Ltd	44	2.84	2.04	23.09	4.54
Grasim Ind. Ltd	43	1.70	8.16	10.34	6.44
Reliance Ind. Ltd	43	23.73	22.45	179.90	0.16
Tata Motors Ltd	43	1.73	38.78	8.79	0.26
Tata Steel Ltd	43	3.65	18.37	31.64	0.18
Reliance Comms. Ltd	42	7.58	12.24	68.89	0.23
Reliance Infra. Ltd	41	2.12	10.20	26.09	0.10
A B B Ltd	39	1.80	20.41	10.28	1.31
Cipla Ltd	39	1.23	57.14	4.23	0.14
G A I L India Ltd	38	2.59	8.16	16.51	4.29
Tata Consultancy Services Ltd	38	5.71	14.29	25.24	5.02
Larsen Toubro Ltd	35	6.39	4.08	40.58	*
N T P C Ltd	35	11.68	14.29	96.39	0.10
Sun Pharm. Inds Ltd	32	1.83	53.06	4.89	0.00
N A L C O	31	2.10	6.12	10.03	*
Tata Power Co Ltd	31	1.86	8.16	15.72	0.00
Mahindra Mahindra Ltd	29	1.23	12.24	6.72	0.33
Infosys Ltd	28	5.93	0.00	19.58	5.08
Satyam Computer Services Ltd	25	1.91	2.04	5.64	4.45
I T C Ltd	23	5.60	16.33	28.14	0.00
Siemens Ltd	22	1.50	6.12	10.34	0.05
Wipro Ltd	22	4.55	4.08	18.62	2.82
Ambuja Cements Ltd	20	1.33	8.16	4.22	0.82
Hindustan Unilever Ltd	18	3.59	0.00	15.15	0.67
Maruti Suzuki India Ltd	14	1.72	2.04	5.18	0.24

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.10 SIFs, 2008 Q2

The table presents the estimates of GC, MES, CoVaR, and SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.13334.64 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
Kotak Mahindra Bank Ltd	85	1.19	34.69	11.31	12.93
Reliance Capital Ltd	83	1.66	26.53	22.53	6.95
I C I C I Bank Ltd	81	5.26	42.86	42.21	9.48
Neyveli Lignite Corpn Ltd	73	1.34	20.41	19.82	2.74
State Bank Of India	73	5.29	24.49	39.57	21.33
Indian Oil Corpn Ltd	72	2.97	20.41	27.10	6.74
Jaiprakash Associates Ltd	71	1.27	16.33	15.14	4.47
S A I L	69	4.32	18.37	43.48	4.27
G M R Infra. Ltd	65	1.10	16.33	12.80	*
Axis Bank Ltd	63	1.63	12.24	12.10	7.28
Sterlite Ind. India Ltd	63	3.71	18.37	34.07	*
Unitech Ltd	63	2.09	4.08	22.69	8.09
Cairn India Ltd	62	3.90	42.86	27.93	*
Bharti Airtel Ltd	61	10.27	40.82	42.47	7.28
Hindustan Zinc Ltd	59	1.69	28.57	12.37	*
H D F C Bank Ltd	57	3.21	18.37	18.46	12.71
Hindalco Ind. Ltd	57	1.31	8.16	12.49	2.32
Idea Cellular Ltd	57	1.85	20.41	13.71	*
Jindal Steel Power Ltd	57	2.03	20.41	24.52	0.07
Reliance Comms. Ltd	56	6.85	18.37	61.07	0.88
J S W Steel Ltd	55	1.26	14.29	9.90	*
B H E L	54	5.06	10.20	37.33	5.69
Grasim Ind. Ltd	54	1.27	8.16	7.78	15.54
Essar Oil Ltd	52	1.55	12.24	24.68	0.00
H D F C Ltd	52	4.19	20.41	33.11	0.11
Reliance Infra. Ltd	51	1.36	10.20	16.30	0.09
Suzlon Energy Ltd	49	2.42	2.04	19.96	3.79
Tata Steel Ltd	47	3.99	18.37	32.74	0.07
Oil Natural Gas Corpn Ltd	46	13.07	4.08	93.56	6.21
Ranbaxy Labs. Ltd	46	1.46	44.90	6.65	0.19
Cipla Ltd	42	1.23	55.10	4.51	0.09
Larsen Toubro Ltd	42	4.79	10.20	29.17	*
Reliance Ind. Ltd	41	22.84	16.33	166.77	0.08
Tata Motors Ltd	40	1.23	30.61	6.91	0.06
N T P C Ltd	37	9.39	10.20	73.42	0.06
Tata Consultancy Services Ltd	36	6.30	4.08	29.90	5.72
Sun Pharm. Inds Ltd	35	2.18	59.18	6.29	0.00
Tata Power Co Ltd	35	1.75	6.12	14.73	0.00
A B B Ltd	33	1.28	6.12	7.94	0.83
Wipro Ltd	31	4.82	4.08	23.75	2.48
G A I L India Ltd	30	2.11	6.12	13.90	0.09
Infosys Ltd	30	7.45	0.00	28.26	4.31
N A L C O	30	1.70	2.04	8.83	*
Adani Enterprises Ltd	27	1.13	10.20	6.83	0.05
H C L Tech. Ltd	27	1.26	8.16	8.18	0.00
Satyam Computer Services Ltd	26	2.20	0.00	6.97	3.68
I T C Ltd	25	5.31	10.20	31.52	0.00
Hindustan Unilever Ltd	19	3.38	0.00	13.98	0.45
Glenmark Pharm. Ltd	17	1.19	4.08	6.89	0.00
Maruti Suzuki India Ltd	15	1.34	0.00	4.32	0.10

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.11 SIFs, 2008 Q3

The table presents the estimates of GC, MES, CoVaR, and SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.13661.83 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
Kotak Mahindra Bank Ltd	83	1.40	24.49	14.67	26.20
G M R Infra. Ltd	80	1.18	16.33	13.33	15.11
I C I C I Bank Ltd	75	4.36	22.45	39.74	10.41
S A I L	75	3.86	16.33	42.93	6.65
Neyveli Lignite Corpn Ltd	71	1.03	16.33	15.30	3.99
Axis Bank Ltd	67	1.89	16.33	15.89	7.65
Reliance Capital Ltd	66	2.06	22.45	27.96	2.51
Essar Oil Ltd	65	1.40	20.41	23.54	1.75
Unitech Ltd	65	1.39	8.16	15.39	5.13
State Bank Of India	63	6.80	14.29	46.99	22.44
D L F Ltd	61	4.40	12.24	46.63	*
Hindalco Ind. Ltd	60	1.22	6.12	12.03	4.94
Punjab National Bank	60	1.10	12.24	7.88	9.82
Sterlite Ind. India Ltd	60	2.22	14.29	20.94	*
B H E L	57	5.70	12.24	42.83	4.94
Cairn India Ltd	56	2.94	34.69	19.64	*
Hindustan Zinc Ltd	55	1.33	16.33	9.89	*
H D F C Bank Ltd	54	3.83	8.16	25.97	12.28
Indian Oil Corpn Ltd	54	3.55	20.41	30.80	2.04
Power Finance Corpn Ltd	53	1.05	4.08	10.17	*
Grasim Ind. Ltd	51	1.13	10.20	6.95	9.46
Idea Cellular Ltd	51	1.71	10.20	14.16	*
Jindal Steel Power Ltd	50	1.44	14.29	18.59	0.00
G A I L India Ltd	49	2.53	10.20	17.72	4.61
Suzlon Energy Ltd	49	1.67	2.04	14.67	4.43
Hero Motocorp Ltd	47	1.27	20.41	4.06	4.80
Bank Of India	46	1.10	10.20	6.96	4.66
Tata Steel Ltd	46	2.28	18.37	19.53	0.67
H D F C Ltd	43	4.46	10.20	38.79	0.89
Oil Natural Gas Corpn Ltd	43	16.19	2.04	111.52	4.78
Reliance Infra. Ltd	42	1.34	6.12	16.74	0.00
Tata Power Co Ltd	42	1.47	6.12	13.43	1.13
I T C Ltd	39	5.19	0.00	34.01	4.70
Tata Comms. Ltd	39	0.99	6.12	6.23	*
N A L C O	38	1.75	6.12	10.82	*
Cipla Ltd	37	1.30	42.86	4.57	0.83
Tata Consultancy Services Ltd	37	4.77	2.04	21.63	5.03
Reliance Comms. Ltd	36	5.04	4.08	47.86	0.00
N T P C Ltd	35	10.37	12.24	84.07	0.00
Sun Pharm. Inds Ltd	34	2.25	48.98	6.73	0.66
Larsen Toubro Ltd	33	5.24	2.04	31.73	*
Bharti Airtel Ltd	32	10.90	4.08	42.95	4.02
Reliance Ind. Ltd	29	20.74	8.16	146.54	0.00
Wipro Ltd	25	3.64	2.04	18.94	3.85
Tata Motors Ltd	21	1.13	6.12	6.14	0.56
A B B Ltd	17	1.22	0.00	6.95	0.35
Infosys Ltd	17	5.86	0.00	23.10	0.83
Maruti Suzuki India Ltd	17	1.46	0.00	5.23	1.10
Satyam Computer Services Ltd	17	1.47	0.00	5.02	1.17
Hindustan Unilever Ltd	13	4.02	0.00	17.62	0.23

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.12 SIFs, 2008 Q4

The table presents the estimates of GC, MES, CoVaR, and SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.14652.84 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
Kotak Mahindra Bank Ltd	83	0.84	30.61	10.50	21.95
I C I C I Bank Ltd	82	3.40	28.57	44.74	7.02
G M R Infra. Ltd	76	0.96	16.33	12.24	10.09
S A I L	76	2.18	38.78	25.29	3.15
Neyveli Lignite Corpn Ltd	73	0.76	12.24	13.33	5.97
Idea Cellular Ltd	70	1.11	61.22	11.12	*
Essar Oil Ltd	69	0.71	34.69	15.69	1.61
Adani Ports and SEZ Ltd	67	0.89	26.53	9.41	*
Reliance Capital Ltd	67	0.91	12.24	15.02	2.99
State Bank Of India	65	5.58	20.41	45.95	16.91
Sterlite Ind. India Ltd	62	1.26	14.29	17.26	*
D L F Ltd	61	3.28	14.29	44.48	*
Axis Bank Ltd	60	1.24	10.20	12.86	4.72
Cairn India Ltd	58	2.23	12.24	27.81	*
Bharti Airtel Ltd	57	9.27	28.57	75.86	2.06
Grasim Ind. Ltd	57	0.76	12.24	6.84	6.27
Tata Power Co Ltd	55	1.13	24.49	14.52	0.69
Oil Natural Gas Corpn Ltd	54	9.74	12.24	96.54	2.37
Reliance Ind. Ltd	53	13.24	28.57	153.70	0.00
Jindal Steel Power Ltd	52	0.96	18.37	13.49	0.00
H D F C Bank Ltd	51	2.90	10.20	22.15	9.73
Power Grid Corpn Of India Ltd	51	2.39	14.29	22.41	*
Tata Steel Ltd	51	1.08	12.24	15.56	1.60
Tata Comms. Ltd	49	0.98	16.33	7.66	*
Punjab National Bank	47	1.13	8.16	8.87	7.04
Reliance Comms. Ltd	47	3.20	12.24	51.62	0.00
G A I L India Ltd	46	1.79	8.16	15.31	3.31
N A L C O	46	0.83	10.20	7.43	*
H D F C Ltd	43	2.89	12.24	29.08	1.79
Larsen Toubro Ltd	43	3.09	8.16	28.27	*
Reliance Infra. Ltd	43	0.90	8.16	16.85	0.00
Hindustan Zinc Ltd	41	0.98	8.16	8.57	*
Bank Of India	40	1.03	8.16	6.20	4.71
Sun Pharm. Inds Ltd	40	1.50	67.35	5.76	1.29
Wipro Ltd	40	2.33	2.04	19.65	3.12
Indian Oil Corpn Ltd	39	3.47	28.57	26.20	0.48
B H E L	38	4.55	6.12	46.25	1.93
Power Finance Corpn Ltd	38	1.04	4.08	9.22	*
N T P C Ltd	37	10.16	12.24	101.59	0.25
Ranbaxy Labs. Ltd	33	0.72	16.33	4.98	1.27
Satyam Computer Services Ltd	33	0.79	4.08	4.70	3.08
I T C Ltd	32	4.42	6.12	26.25	2.28
Bharat Petro. Corpn Ltd	31	0.93	28.57	4.20	0.35
Tata Consultancy Services Ltd	31	3.19	2.04	22.86	2.10
Cipla Ltd	27	0.99	14.29	5.17	1.85
Infosys Ltd	27	4.36	0.00	23.20	2.14
Ambuja Cements Ltd	26	0.73	6.12	6.88	0.00
Hindustan Unilever Ltd	22	3.72	10.20	21.09	1.20
Maruti Suzuki India Ltd	19	1.03	14.29	5.03	0.00
Hero Motocorp Ltd	17	1.10	4.08	5.60	1.85

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.13 SIFs, 2009 Q1

The table presents the estimates of GC, MES, CoVaR, and SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.14651.31 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
I C I C I Bank Ltd	86	2.53	22.45	35.45	8.47
S A I L	84	2.72	46.94	31.23	3.52
Idea Cellular Ltd	83	1.06	38.78	10.47	8.63
State Bank Of India	74	4.62	16.33	38.34	14.39
Jaiprakash Associates Ltd	71	0.68	8.16	13.84	3.11
D L F Ltd	69	1.94	10.20	29.22	*
Bharti Airtel Ltd	65	8.11	20.41	70.59	2.66
Reliance Power Ltd	63	1.67	10.20	16.99	*
Sterlite Ind. India Ltd	63	1.73	8.16	23.05	*
Wipro Ltd	63	2.46	10.20	21.82	3.33
Axis Bank Ltd	61	1.02	6.12	10.26	4.94
Neyveli Lignite Corpn Ltd	61	0.96	6.12	9.43	8.47
Larsen Toubro Ltd	59	2.68	12.24	25.33	*
Reliance Ind. Ltd	59	16.38	36.73	181.58	0.00
Reliance Infra. Ltd	59	0.80	16.33	12.78	0.00
H D F C Bank Ltd	58	2.83	6.12	23.70	10.51
Punjab National Bank	57	0.89	12.24	5.71	5.07
G M R Infra. Ltd	56	1.18	4.08	10.29	11.41
Bank Of India	55	0.79	12.24	4.84	5.42
Oil Natural Gas Corpn Ltd	55	11.39	8.16	87.46	4.17
Tata Comms. Ltd	55	1.01	14.29	7.75	*
Jindal Steel Power Ltd	53	1.27	20.41	12.67	0.00
Cairn India Ltd	51	2.38	4.08	25.23	2.56
N A L C O	51	0.94	4.08	10.37	*
G A I L India Ltd	49	2.13	6.12	17.12	3.70
Reliance Comms. Ltd	49	2.46	6.12	42.07	1.20
Hindustan Zinc Ltd	46	1.30	10.20	8.05	*
Tata Power Co Ltd	46	1.16	12.24	9.52	2.35
Adani Ports and SEZ Ltd	45	0.88	10.20	5.32	*
Ambuja Cements Ltd	45	0.73	8.16	7.49	0.66
Grasim Ind. Ltd	45	0.99	6.12	7.50	3.10
Tata Steel Ltd	45	1.03	4.08	15.31	1.73
Mahindra Mahindra Ltd	42	0.73	12.24	6.44	0.36
I T C Ltd	41	4.76	8.16	20.20	2.97
H D F C Ltd	37	2.74	4.08	26.46	1.90
Maruti Suzuki India Ltd	37	1.54	22.45	8.41	0.43
N T P C Ltd	36	10.12	14.29	75.07	0.00
N M D C Ltd	34	4.22	4.08	26.84	*
Sun Pharm. Inds Ltd	34	1.57	18.37	2.26	1.43
B H E L	33	5.05	4.08	41.89	2.26
Power Grid Corpn Of India Ltd	33	2.75	4.08	17.09	*
Tata Consultancy Services Ltd	33	3.60	6.12	27.18	2.49
Bharat Petro. Corpn Ltd	32	0.93	18.37	2.93	0.52
Hindustan Unilever Ltd	31	3.53	12.24	12.59	1.58
Power Finance Corpn Ltd	31	1.13	0.00	4.47	3.99
Infosys Ltd	30	5.18	2.04	23.71	2.76
A C C Ltd	27	0.74	6.12	5.33	1.19
Indian Oil Corpn Ltd	21	3.16	8.16	8.76	1.05
Hero Motocorp Ltd	18	1.46	2.04	4.66	2.56
Cipla Ltd	13	1.17	4.08	5.33	0.00

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.14 SIFs, 2009 Q2

The table presents the estimates of GC, MES, CoVaR, and SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.14326.48 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
Idea Cellular Ltd	83	1.54	40.82	14.90	12.25
S A I L	78	4.36	34.69	48.94	5.51
I C I C I Bank Ltd	77	5.61	18.37	76.94	7.94
State Bank Of India	76	7.73	34.69	62.71	23.31
Kotak Mahindra Bank Ltd	71	1.53	10.20	17.33	26.54
Neyveli Lignite Corpn Ltd	69	1.42	14.29	13.62	9.64
G M R Infra. Ltd	67	1.82	14.29	15.49	10.77
Sterlite Ind. India Ltd	67	3.00	16.33	39.13	*
Wipro Ltd	67	3.87	24.49	33.55	5.35
Essar Oil Ltd	65	1.28	22.45	19.11	1.45
Jaiprakash Associates Ltd	65	2.00	8.16	39.87	5.58
Axis Bank Ltd	61	2.09	8.16	20.63	9.01
D L F Ltd	61	3.68	10.20	54.27	*
Reliance Power Ltd	61	2.80	14.29	27.81	*
Reliance Capital Ltd	59	1.54	4.08	21.90	7.42
Reliance Ind. Ltd	58	22.23	46.94	240.97	0.30
Bharti Airtel Ltd	57	10.63	14.29	90.49	5.46
H D F C Bank Ltd	57	4.44	10.20	36.42	9.99
Tata Steel Ltd	55	1.99	16.33	29.06	1.03
Reliance Infra. Ltd	54	1.88	14.29	29.56	0.74
Punjab National Bank	53	1.49	12.24	9.40	8.87
H D F C Ltd	50	4.66	18.37	43.95	1.39
Larsen Toubro Ltd	50	6.42	10.20	59.20	*
N A L C O	48	1.38	4.08	14.79	*
B H E L	47	7.53	6.12	61.13	6.66
G A I L India Ltd	47	2.55	8.16	20.10	5.68
Bank Of India	45	1.29	10.20	7.78	8.02
Mahindra Mahindra Ltd	45	1.35	12.24	11.60	3.12
Tata Consultancy Services Ltd	45	5.33	16.33	39.35	4.03
Oil Natural Gas Corpn Ltd	43	15.93	6.12	119.65	5.69
Reliance Comms. Ltd	42	4.17	8.16	69.64	0.00
Adani Ports and SEZ Ltd	37	1.69	10.20	9.94	*
Cairn India Ltd	37	3.08	2.04	31.90	2.15
Grasim Ind. Ltd	37	1.48	4.08	10.95	4.89
Jindal Steel Power Ltd	35	2.69	8.16	26.19	0.58
N M D C Ltd	32	9.93	4.08	61.80	*
Adani Enterprises Ltd	31	1.41	14.29	10.10	0.49
Maruti Suzuki India Ltd	31	2.16	16.33	11.53	1.05
Power Grid Corpn Of India Ltd	31	3.21	4.08	19.55	*
Hindustan Zinc Ltd	29	1.78	2.04	10.75	*
I T C Ltd	26	5.03	2.04	20.85	4.54
Tata Power Co Ltd	26	1.78	4.08	14.29	1.44
Hero Motocorp Ltd	25	1.95	4.08	6.08	4.26
Power Finance Corpn Ltd	23	1.55	8.16	6.00	2.64
Hindustan Unilever Ltd	21	4.07	8.16	14.18	2.00
Infosys Ltd	21	7.11	4.08	31.83	3.57
Cipla Ltd	17	1.37	6.12	6.14	1.28
Indian Oil Corpn Ltd	17	4.51	12.24	12.23	0.00
Sun Pharm. Inds Ltd	17	1.58	10.20	2.22	1.06
N T P C Ltd	15	11.23	0.00	81.42	0.56

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.15 SIFs, 2009 Q3

The table presents the estimates of GC, MES, CoVaR, and SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.14976.39 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
Unitech Ltd	86	1.71	28.57	40.76	9.07
I C I C I Bank Ltd	81	6.75	28.57	96.70	8.87
Kotak Mahindra Bank Ltd	79	1.80	16.33	21.70	24.56
Idea Cellular Ltd	78	1.56	42.86	14.21	17.40
S A I L	75	4.71	34.69	55.53	6.00
State Bank Of India	74	9.30	30.61	81.80	23.46
Neyveli Lignite Corpn Ltd	71	1.50	18.37	15.45	12.60
Reliance Capital Ltd	71	1.51	12.24	23.57	9.23
G M R Infra. Ltd	67	1.72	16.33	16.27	12.11
Sterlite Ind. India Ltd	67	4.36	18.37	61.49	*
B H E L	63	7.61	16.33	60.84	14.20
Wipro Ltd	63	5.89	30.61	46.69	8.14
N A L C O	62	1.50	20.41	15.13	*
Axis Bank Ltd	61	2.64	10.20	28.65	6.79
Hindalco Ind. Ltd	61	1.47	46.94	17.93	0.33
Reliance Ind. Ltd	61	24.16	51.02	298.47	0.00
Reliance Power Ltd	61	2.69	16.33	28.51	*
Tata Steel Ltd	59	3.02	14.29	50.05	3.86
Jaiprakash Associates Ltd	56	2.22	10.20	47.50	3.54
Larsen Toubro Ltd	56	6.63	14.29	69.20	*
H D F C Bank Ltd	54	4.71	16.33	36.72	6.70
H D F C Ltd	53	5.31	32.65	52.18	2.46
Mahindra Mahindra Ltd	53	1.64	10.20	14.53	6.19
D L F Ltd	52	4.96	12.24	80.32	2.66
Cairn India Ltd	51	3.32	0.00	39.01	6.97
Reliance Comms. Ltd	51	4.26	14.29	75.09	0.00
Reliance Infra. Ltd	51	1.84	14.29	32.95	0.00
Power Finance Corpn Ltd	50	1.76	14.29	8.16	9.56
Punjab National Bank	50	1.68	12.24	12.17	8.33
Infosys Ltd	49	8.83	20.41	41.83	4.40
Bharti Airtel Ltd	48	10.62	12.24	90.46	4.29
Jindal Steel Power Ltd	48	3.65	20.41	38.60	0.00
Oil Natural Gas Corpn Ltd	47	16.74	10.20	136.25	5.14
G A I L India Ltd	45	3.04	8.16	25.38	6.17
Tata Motors Ltd	42	1.78	6.12	19.56	3.75
H C L Tech. Ltd	41	1.53	10.20	16.37	0.65
Power Grid Corpn Of India Ltd	40	3.09	10.20	21.11	*
Grasim Ind. Ltd	39	1.70	4.08	13.38	5.65
Maruti Suzuki India Ltd	35	3.28	24.49	17.39	0.47
Tata Consultancy Services Ltd	31	8.12	8.16	58.04	3.96
Hindustan Zinc Ltd	29	2.33	2.04	14.65	*
N M D C Ltd	28	9.51	2.04	57.81	*
Tata Power Co Ltd	27	2.09	4.08	17.64	0.86
Sun Pharm. Inds Ltd	26	1.95	14.29	3.71	2.74
N T P C Ltd	25	11.77	10.20	83.69	0.00
Hero Motocorp Ltd	23	2.23	4.08	9.09	4.01
I T C Ltd	23	5.88	4.08	21.55	4.16
Cipla Ltd	20	1.50	4.08	6.72	2.91
Hindustan Unilever Ltd	17	3.82	8.16	13.28	1.49
Indian Oil Corpn Ltd	15	5.52	4.08	16.43	2.07

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.16 SIFs, 2009 Q4

The table presents the estimates of GC, MES, CoVaR, and SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.17004.81 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
State Bank Of India	87	8.47	38.78	77.99	14.07
Neyveli Lignite Corpn Ltd	84	1.51	28.57	15.06	13.39
D L F Ltd	77	3.61	18.37	51.52	5.16
I C I C I Bank Ltd	76	5.75	28.57	66.90	2.38
Kotak Mahindra Bank Ltd	75	1.65	18.37	18.24	6.15
Reliance Ind. Ltd	70	20.97	36.73	178.03	1.93
H D F C Bank Ltd	69	4.56	24.49	27.04	9.89
S A I L	69	5.87	22.45	70.79	1.77
Reliance Infra. Ltd	68	1.52	24.49	21.36	1.03
Sesa Goa Ltd	67	1.98	20.41	18.11	4.28
Reliance Power Ltd	64	2.19	20.41	21.24	*
Power Grid Corpn Of India Ltd	63	2.73	18.37	19.05	6.03
Hindustan Zinc Ltd	61	3.01	34.69	16.71	*
Power Finance Corpn Ltd	61	1.76	20.41	7.84	11.08
Jindal Steel Power Ltd	60	3.85	10.20	37.01	6.09
Larsen Toubro Ltd	59	5.92	18.37	48.62	*
Reliance Comms. Ltd	59	2.09	22.45	26.17	0.00
Punjab National Bank	58	1.68	10.20	13.62	6.83
Sterlite Ind. India Ltd	57	4.27	12.24	41.06	*
H D F C Ltd	53	4.50	28.57	34.23	0.00
Tata Steel Ltd	53	3.22	14.29	42.17	0.00
Indian Oil Corpn Ltd	51	4.37	26.53	14.83	2.29
N M D C Ltd	51	9.88	12.24	72.75	*
N T P C Ltd	51	11.43	10.20	57.68	7.13
Tata Power Co Ltd	51	1.93	46.94	9.41	0.00
Cairn India Ltd	47	3.15	18.37	24.27	0.00
G A I L India Ltd	46	3.08	14.29	10.34	5.38
Axis Bank Ltd	45	2.35	8.16	25.57	0.87
B H E L	45	6.92	10.20	36.62	3.49
G M R Infra. Ltd	45	1.44	8.16	8.92	4.26
Infosys Ltd	45	8.77	38.78	27.10	0.61
Hindalco Ind. Ltd	43	1.81	10.20	18.00	0.00
Oil Natural Gas Corpn Ltd	40	14.82	16.33	100.64	0.00
Tata Motors Ltd	40	2.23	6.12	23.54	0.00
Adani Ports and SEZ Ltd	39	1.30	2.04	5.22	7.13
Cipla Ltd	39	1.58	30.61	4.24	0.00
N A L C O	39	1.58	6.12	10.55	*
Wipro Ltd	39	5.87	16.33	28.39	1.63
Bharat Petro. Corpn Ltd	37	1.35	14.29	3.34	2.04
Bharti Airtel Ltd	37	7.36	8.16	32.46	3.54
Mahindra Mahindra Ltd	35	1.78	14.29	9.00	0.00
Grasim Ind. Ltd	33	1.33	4.08	5.21	3.07
H C L Tech. Ltd	31	1.47	6.12	10.66	0.00
Tata Consultancy Services Ltd	29	8.64	10.20	39.74	0.75
Bajaj Auto Ltd	26	1.49	8.16	3.29	*
Hero Motocorp Ltd	25	2.02	12.24	3.83	0.71
Sun Pharm. Inds Ltd	23	1.84	14.29	2.78	0.00
Hindustan Unilever Ltd	21	3.40	10.20	0.12	0.97
I T C Ltd	17	5.60	8.16	13.45	0.49
Maruti Suzuki India Ltd	16	2.65	4.08	7.13	0.00

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.17 SIFs, 2011 Q3

The table presents the estimates of GC, MES, CoVaR, and SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.23456.26 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
Axis Bank Ltd	90	1.42	28.57	10.99	11.28
Kotak Mahindra Bank Ltd	81	1.36	24.49	8.61	14.10
Mahindra Mahindra Ltd	81	1.78	30.61	12.80	6.44
I C I C I Bank Ltd	79	3.36	22.45	27.83	6.36
I T C Ltd	72	6.69	28.57	34.19	7.93
Sterlite Ind. India Ltd	71	1.29	10.20	11.65	*
Adani Enterprises Ltd	69	1.38	6.12	11.46	7.58
Larsen Toubro Ltd	69	2.59	12.24	19.09	*
State Bank Of India	68	4.38	6.12	28.89	16.39
Maruti Suzuki India Ltd	66	1.13	18.37	4.75	10.36
Bank Of Baroda	65	1.11	14.29	5.30	9.60
Punjab National Bank	65	1.05	16.33	4.74	9.62
Bajaj Auto Ltd	63	1.96	24.49	9.92	5.22
Reliance Ind. Ltd	59	9.67	10.20	66.88	4.56
H C L Tech. Ltd	57	1.14	20.41	8.72	0.00
Jindal Steel Power Ltd	57	1.81	4.08	12.47	6.96
G A I L India Ltd	56	2.07	12.24	8.71	6.44
Hindustan Zinc Ltd	56	2.16	28.57	7.91	*
H D F C Ltd	56	4.10	18.37	28.25	2.35
D L F Ltd	54	1.33	10.20	9.73	1.96
N M D C Ltd	53	2.72	4.08	13.87	11.95
Tata Motors Ltd	52	2.05	4.08	18.84	4.88
H D F C Bank Ltd	51	4.26	14.29	26.89	2.50
Tata Steel Ltd	51	1.37	2.04	9.32	6.39
Infosys Ltd	49	6.78	6.12	38.64	4.94
Wipro Ltd	48	4.18	6.12	23.14	4.98
Coal India Ltd	47	8.10	14.29	25.84	*
Grasim Ind. Ltd	46	0.97	6.12	2.59	10.18
Idea Cellular Ltd	46	1.16	14.29	4.77	4.87
M M T C Ltd	46	2.30	0.00	15.40	*
Tata Consultancy Services Ltd	45	9.68	8.16	53.95	3.96
Adani Ports and SEZ Ltd	43	1.03	6.12	6.67	2.97
Power Grid Corpn Of India Ltd	42	1.98	0.00	9.28	7.24
S A I L	41	1.44	8.16	8.86	1.39
Hindustan Unilever Ltd	40	3.75	6.12	6.15	9.09
Hero Motocorp Ltd	39	1.62	6.12	4.04	6.63
Oil Natural Gas Corpn Ltd	39	9.36	8.16	33.88	4.91
B H E L	36	2.49	4.08	15.07	4.26
Bharti Airtel Ltd	35	5.56	4.08	33.60	4.08
N T P C Ltd	33	5.65	8.16	28.09	0.00
Sun Pharm. Inds Ltd	33	2.20	4.08	7.82	6.17
Cairn India Ltd	29	2.55	0.00	16.27	1.23
Ambuja Cements Ltd	28	1.02	8.16	3.71	0.24
Dr Reddy S Labs. Ltd	27	1.14	4.08	4.23	4.86
Nestle India Ltd	23	1.68	2.04	2.15	*
Asian Paints Ltd	20	1.06	4.08	3.31	3.93
Ultratech Cement Ltd	20	1.36	6.12	3.57	1.71
Oil India Ltd	15	1.22	4.08	2.38	2.65
Cipla Ltd	13	1.10	2.04	2.61	2.06
Indian Oil Corpn Ltd	7	2.63	0.00	4.46	0.03

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.18 SIFs, 2012 Q1

The table presents the estimates of GC, MES, CoVaR, and SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.24838.03 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
State Bank Of India	88	5.66	18.37	49.35	18.70
I C I C I Bank Ltd	81	4.13	14.29	39.26	7.91
Adani Enterprises Ltd	80	1.35	8.16	14.67	10.37
Axis Bank Ltd	79	1.91	8.16	17.69	12.68
Kotak Mahindra Bank Ltd	76	1.63	16.33	9.74	16.62
Jindal Steel Power Ltd	73	2.05	14.29	16.86	6.75
Maruti Suzuki India Ltd	69	1.57	20.41	7.29	8.98
Sterlite Ind. India Ltd	69	1.50	8.16	14.91	*
G A I L India Ltd	68	1.92	22.45	6.89	10.44
B H E L	67	2.53	6.12	23.52	6.11
Bharti Airtel Ltd	67	5.17	20.41	38.66	5.75
D L F Ltd	63	1.38	16.33	12.27	4.57
Power Grid Corp'n Of India Ltd	63	2.02	6.12	11.05	10.61
Bank Of Baroda	61	1.32	4.08	8.30	12.02
Larsen Toubro Ltd	59	3.23	6.12	25.82	*
I T C Ltd	58	7.14	14.29	23.03	9.62
H D F C Ltd	57	4.00	22.45	20.95	4.48
Reliance Power Ltd	57	1.32	12.24	12.35	1.07
Reliance Ind. Ltd	56	9.88	8.16	83.20	4.85
Punjab National Bank	55	1.26	2.04	7.79	10.99
Tata Motors Ltd	55	2.98	0.00	25.53	7.08
Tata Steel Ltd	55	1.84	0.00	16.96	6.48
Bajaj Auto Ltd	52	1.96	4.08	10.71	8.68
Adani Ports and SEZ Ltd	50	1.04	8.16	6.65	4.81
S A I L	50	1.57	4.08	15.35	4.27
H C L Tech. Ltd	49	1.35	16.33	9.21	0.00
H D F C Bank Ltd	49	4.91	14.29	27.86	3.41
Hindustan Unilever Ltd	49	3.57	10.20	6.23	9.01
Mahindra Mahindra Ltd	47	1.73	4.08	13.07	5.64
Tata Consultancy Services Ltd	46	9.21	6.12	41.73	5.81
N M D C Ltd	45	2.57	2.04	16.48	5.92
Cairn India Ltd	43	2.56	4.08	19.52	4.38
Coal India Ltd	42	8.75	6.12	29.97	*
Infosys Ltd	42	6.63	2.04	34.53	6.48
Idea Cellular Ltd	41	1.32	16.33	5.64	2.94
Wipro Ltd	39	4.36	2.04	22.03	6.11
Hero Motocorp Ltd	36	1.65	2.04	5.58	7.35
Sun Pharm. Inds Ltd	33	2.38	4.08	3.57	6.19
Hindustan Zinc Ltd	32	2.25	0.00	8.97	*
M M T C Ltd	27	3.16	2.04	15.86	3.91
Ultratech Cement Ltd	27	1.67	4.08	7.82	2.15
Indian Oil Corp'n Ltd	26	2.57	10.20	4.92	0.73
N T P C Ltd	25	5.40	4.08	25.63	0.00
Nestle India Ltd	24	1.80	2.04	1.00	*
Asian Paints Ltd	23	1.25	4.08	1.04	4.97
Dr Reddy S Labs. Ltd	21	1.20	0.00	2.30	5.59
Oil Natural Gas Corp'n Ltd	20	9.24	4.08	29.45	2.77
Ambuja Cements Ltd	19	1.06	0.00	4.03	3.06
Siemens Ltd	17	1.04	2.04	4.61	0.00
Oil India Ltd	13	1.23	0.00	3.48	1.12

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.19 SIFs, 2012 Q2

The table presents the estimates of GC, MES, CoVaR, and SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.23205.95 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
State Bank Of India	91	6.24	16.33	50.25	17.21
I C I C I Bank Ltd	83	4.47	12.24	39.10	9.03
Axis Bank Ltd	82	1.81	10.20	15.80	12.20
Jindal Steel Power Ltd	73	1.89	8.16	15.12	7.27
Sterlite Ind. India Ltd	72	1.49	8.16	14.58	*
Maruti Suzuki India Ltd	71	1.46	20.41	6.03	8.34
I T C Ltd	70	8.73	20.41	29.35	8.89
Power Grid Corp'n Of India Ltd	68	2.27	8.16	10.62	10.33
G A I L India Ltd	67	1.92	18.37	4.64	9.84
Tata Steel Ltd	66	1.85	2.04	16.39	7.32
B H E L	63	2.45	4.08	23.81	6.05
Kotak Mahindra Bank Ltd	63	1.90	4.08	11.95	15.21
Larsen Toubro Ltd	62	3.69	6.12	27.20	*
Bharti Airtel Ltd	61	4.99	12.24	32.75	5.17
Bank Of Baroda	59	1.30	4.08	7.67	9.12
D L F Ltd	57	1.45	6.12	11.37	4.73
Tata Motors Ltd	57	2.83	4.08	21.94	6.06
N M D C Ltd	56	3.19	2.04	20.13	7.31
Reliance Ind. Ltd	56	10.31	10.20	78.77	4.25
Hindustan Unilever Ltd	53	4.23	20.41	4.25	5.62
Punjab National Bank	53	1.18	0.00	5.90	10.19
Idea Cellular Ltd	52	1.08	12.24	4.77	5.03
Bajaj Auto Ltd	51	1.96	4.08	8.76	7.98
H D F C Bank Ltd	51	5.72	12.24	31.23	3.21
Tata Consultancy Services Ltd	48	10.77	6.12	54.21	4.44
H C L Tech. Ltd	47	1.42	8.16	10.11	0.00
Infosys Ltd	47	6.21	4.08	31.93	5.55
Mahindra Mahindra Ltd	47	1.87	4.08	12.23	5.45
H D F C Ltd	45	4.19	10.20	19.50	3.93
Wipro Ltd	45	4.24	0.00	19.97	6.43
Cipla Ltd	44	1.10	10.20	1.78	5.61
Hero Motocorp Ltd	44	1.85	4.08	6.15	6.79
Reliance Power Ltd	43	1.29	2.04	12.06	0.00
S A I L	43	1.61	0.00	14.05	3.93
Bharat Petro. Corp'n Ltd	39	1.16	14.29	3.14	0.32
Cairn India Ltd	37	2.53	4.08	19.14	0.00
Oil India Ltd	37	1.29	2.04	2.92	6.14
Hindustan Zinc Ltd	35	2.25	0.00	7.56	*
Sun Pharm. Inds Ltd	32	2.84	4.08	2.45	6.08
Coal India Ltd	31	9.44	0.00	22.83	*
Nestle India Ltd	31	1.89	4.08	2.25	*
Indian Oil Corp'n Ltd	29	2.68	8.16	4.62	0.40
M M T C Ltd	29	3.18	4.08	10.55	4.33
Ultratech Cement Ltd	28	1.79	4.08	7.02	2.00
Dr Reddy S Labs. Ltd	27	1.21	4.08	2.10	5.00
N T P C Ltd	25	5.67	2.04	23.64	0.00
Oil Natural Gas Corp'n Ltd	25	10.50	0.00	26.68	4.82
Ambuja Cements Ltd	24	1.15	4.08	3.61	0.42
Bosch Ltd	15	1.23	2.04	1.51	0.14
Asian Paints Ltd	13	1.61	0.00	1.49	3.92

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.

Table B.20 SIFs, 2012 Q3

The table presents the estimates of GC, MES, CoVaR, and SRI for the 50 largest firms. Firms in the table are sorted from the highest (most SIF) to lowest (least SIF) depending on the SRI. The SRI for each firm is computed by taking the average of the percentile ranks across the three measures of systemic risk (GC, MES, and CoVaR). GC measures the level of interconnectedness between firms; MES measures the expected losses of a firm; and CoVaR measures how much a system will lose over and above its VaR in case of a firm's default. The market capitalisation of a firm as a % of GDP is also presented. The banks featuring in the list have been highlighted in bold face. The GDP for this quarter is Rs.23134.3 billion.

Firms	SRI (%ile)	Market Cap (% of GDP)	GC (%)	MES (Rs. Bln)	CoVaR (Rs. Bln)
State Bank Of India	89	6.50	16.33	55.76	14.68
Axis Bank Ltd	79	2.04	8.16	17.62	12.04
I C I C I Bank Ltd	78	5.28	14.29	40.67	8.94
Kotak Mahindra Bank Ltd	70	2.08	10.20	11.70	11.82
Punjab National Bank	67	1.23	8.16	7.66	9.24
Sterlite Ind. India Ltd	67	1.45	10.20	13.17	*
Larsen Toubro Ltd	62	4.24	10.20	33.65	*
Maruti Suzuki India Ltd	62	1.69	16.33	5.69	8.22
Bank Of Baroda	61	1.42	4.08	9.42	10.13
D L F Ltd	60	1.71	16.33	15.79	0.00
H D F C Bank Ltd	59	6.42	22.45	36.28	2.09
Jindal Steel Power Ltd	59	1.73	4.08	12.82	8.60
N M D C Ltd	58	3.32	4.08	26.76	8.12
Tata Steel Ltd	57	1.68	10.20	13.94	4.68
Hindustan Unilever Ltd	56	5.10	20.41	8.59	8.33
I T C Ltd	56	9.25	10.20	29.24	9.71
G A I L India Ltd	55	2.10	12.24	3.78	10.59
N T P C Ltd	55	5.99	10.20	24.64	6.56
Power Grid Corp'n Of India Ltd	55	2.41	6.12	9.91	8.58
Reliance Power Ltd	51	1.19	10.20	10.68	0.87
S A I L	51	1.53	12.24	12.77	0.00
Bharti Airtel Ltd	49	4.36	8.16	23.04	5.27
Cipla Ltd	49	1.32	14.29	1.10	7.92
B H E L	48	2.61	0.00	29.36	5.23
H D F C Ltd	47	5.15	20.41	19.39	1.90
Oil Natural Gas Corp'n Ltd	47	10.39	4.08	33.97	9.10
Reliance Ind. Ltd	46	11.71	8.16	85.31	1.69
Mahindra Mahindra Ltd	45	2.29	2.04	14.57	5.43
Hero Motocorp Ltd	43	1.62	4.08	6.32	6.49
Oil India Ltd	43	1.28	2.04	3.81	10.73
Bajaj Auto Ltd	42	2.29	2.04	7.96	8.62
Coal India Ltd	42	9.80	6.12	30.17	*
Tata Consultancy Services Ltd	42	10.96	10.20	27.68	5.43
A C C Ltd	41	1.19	12.24	5.01	0.38
Nestle India Ltd	40	1.83	12.24	1.09	*
Tata Motors Ltd	37	3.13	4.08	16.91	2.35
Sun Pharm. Inds Ltd	36	3.11	8.16	0.60	5.87
Hindustan Zinc Ltd	35	2.48	2.04	9.47	*
Idea Cellular Ltd	33	1.22	4.08	6.48	2.01
Infosys Ltd	33	6.29	8.16	15.91	2.99
H C L Tech. Ltd	32	1.73	6.12	4.52	4.06
Ultratech Cement Ltd	31	2.33	2.04	9.49	5.08
Cairn India Ltd	30	2.73	4.08	15.25	0.00
Grasim Ind. Ltd	29	1.31	4.08	4.27	4.62
Wipro Ltd	29	4.06	2.04	8.38	6.76
Ambuja Cements Ltd	25	1.34	2.04	5.87	0.98
Asian Paints Ltd	24	1.63	6.12	1.85	2.04
Dr Reddy S Labs. Ltd	19	1.21	0.00	1.28	5.28
M M T C Ltd	19	3.29	2.04	8.67	2.26
Indian Oil Corp'n Ltd	16	2.63	4.08	6.11	0.58

* indicates that the SRI's have been computed by substituting missing CoVaR with the median CoVaR in this quarter.