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Countercyclical Capital Buffer Guidance for India

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Countercyclical Capital Buffer Guidance for India[®]

Basel Committee on Banking Supervision (BCBS) has published its guidance for operating the countercyclical capital buffer. It has, inter alia, recommended that credit-to-GDP ratio could be the buffer guide. This paper argues that BCBS buffer guide is not suitable for India and showcases an alternative buffer guide, reflecting their underlying banking business model. It verifies the historical performance of the alternative buffer guide in the Indian context and finds evidence – supported by the corroborative behaviour of the real sector and asset markets - that the alternative guide tracks credit cycles in India better.

JEL Classification: E58, E61, G21, G28

Keywords: Countercyclical capital buffers, credit-to-GDP Gap, CD ratio, Credit aggregates, Leverage

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Countercyclical Capital Buffer Guidance for India

The recent financial crisis has redefined the broad contours of regulation of financial sector, globally. The G-20 Working Group 1 on *Enhancing Sound Regulation and Strengthening Transparency*, constituted in 2008, submitted its recommendations, which formed the bedrock of blueprint for the global regulatory reform agenda. Procyclicality has been among the identified underlying causes for the recent crisis. Various measures have accordingly been proposed by international standard setters to address the problem of procyclicality. One such measure put forward by the Basel Committee on Banking Supervision (BCBS) is countercyclical capital buffers. In December 2010, BCBS issued *Guidance for national authorities operating the countercyclical capital buffer* recommending, *inter alia*, a buffer guide for the consideration of national authorities. In this context, relevant questions are: Is the suggested buffer guide suitable especially for India, relying largely on retail model of banking business? If not, is there any alternative buffer guide more suitable for it? If so, what is it? This paper endeavours to address these questions of relevance in detail and is organized into 5 sections. Section 1 outlines the BCBS set of proposals with regard to the guidance to the national authorities for operating the countercyclical capital buffer. Section 2 argues that BCBS capital buffer guidance is not suitable for India. While Section 3 analyses methodology for constructing an alternative buffer guide customized to macro-financial environment in which banks in India operate, Section 4 presents the historical performance of the proposed alternative buffer guide in the Indian context. Finally, Section 5 concludes.

1. The BCBS Proposals for Operating Countercyclical Capital Buffer

A. Objective

The countercyclical capital buffer regime is targeted at dampening liquidity cycles. It will tend to mitigate the expansion in bank balance sheets and the build up of leverage during the boom periods (CGFS, 2011) through the use of a buffer of capital to achieve the broader macroprudential goal of protecting the banking sector from periods of excess aggregate credit growth that have often been associated with the build up of system-wide risk. Protecting the banking sector in this context is not

simply ensuring that individual banks remain solvent through a period of stress, but ensuring that the banking sector in aggregate has the capital on hand to help maintain the flow of credit in the economy without its solvency being questioned, when the broader financial system experiences stress after a period of excess credit growth. This primary objective could have a positive side-benefit of moderating effect on the build-up phase of the credit cycle. The relevant authority in each jurisdiction will be required to monitor credit growth and make assessments of whether such growth is excessive and is leading to the build up of system-wide risk. Based on this assessment, they need to use their judgment to determine whether a countercyclical buffer requirement should be imposed. Principles underpinning the role of judgment and the common reference guide are as follows:

B. Principles

Principle 1: (*Objectives*) Protecting the banking system against potential future losses when excess credit growth is associated with an increase in system-wide risk should be the primary motive behind buffer decisions.

Principle 2: (*Common reference guide*) Credit/GDP guide is a useful common reference point in taking buffer decisions. Credit includes both bank and non-bank sources of credit. However, it does not need to play a dominant role in the information used by authorities to take and explain buffer decisions. Authorities should explain the information used, and how it is taken into account in formulating buffer decisions.

Principle 3: (*Risk of misleading signals*) Assessments of the information contained in the credit/GDP guide and any other guides should be mindful of the behaviour of the factors that can lead them to give misleading signals. In assessing a broad set of information to take buffer decisions in both the build-up and release phases, authorities should look for evidence as to whether the inferences from the credit/GDP guide are consistent with those of other variables. Some examples of other variables that may be useful indicators in both phases include various asset prices; funding spreads and CDS spreads; credit condition surveys; real GDP growth; and data on the ability of non-financial entities to meet their debt obligations on a timely basis.

Principle 4: (*Prompt release*) Promptly releasing the buffer in times of stress is essential as it can help to reduce the risk of the supply of credit being constrained by regulatory capital requirements.

Principle 5: (*Other macroprudential tools*) The buffer is an important instrument in a suite of macroprudential tools at the disposal of the authorities.

C. Jurisdictional reciprocity

The host authorities should take the lead in setting buffer requirement that would apply to credit exposures held by local entities located in their jurisdiction. They would also be expected to promptly inform their foreign counterparts of buffer decisions so that authorities in other jurisdictions can require their banks to respect them. Without such a level playing field on the minimum buffer add-on, the impact of foreign banks (not subject to buffer) increasing their lending in response to lower competition from domestic banks (subject to buffer) could undermine the buffer regime's potential side benefit of reducing excessive credit in a jurisdiction. As with the minimum capital requirement and capital conservation buffer, host authorities would have the right to demand that the countercyclical capital buffer be held at the individual legal entity level or consolidated level within their jurisdiction.

D. Communications

It is essential to build understanding and credibility in the buffer decisions through effective communication with all the stakeholders including banks and authorities in other jurisdictions (BCBS 2010).

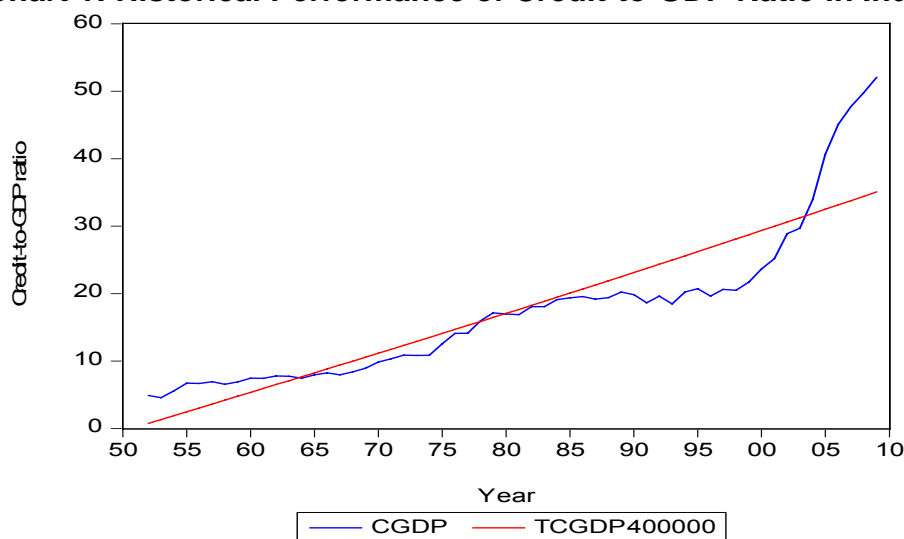
2. BCBS Buffer Guide and its Suitability for India

BCBS recommends that deviation of credit-to-GDP ratio from its long-term trend could be the useful starting reference point for assessing the build-up of system-wide risk in the financial system. Before recommending this buffer guide, BCBS considered a broad range of indicator variables. The variables assessed can be divided into three groups. The first included aggregate macroeconomic variables: GDP growth, (real) credit growth and deviations of the credit to GDP ratio from a long term trend; deviations of real equity prices as well as real property prices from their respective long term trend. The second included measures of banking sector

performance: profits (earnings) and proxies for (gross) losses. The final group included proxies for the cost of funding, in the form of credit spreads. BCBS felt that the credit-to-GDP gap was the best performing of the range of variables considered: It is smoother and being normalized by the size of the economy and is therefore not influenced by the normal cyclical patterns of credit growth; furthermore, by being based on credit, it has the significant advantage over many of the other variables of appealing directly to the objective of the countercyclical capital buffer, which is to achieve the broader macroprudential goal of protecting the banking sector from periods of excess credit growth.

How does the credit-to-GDP ratio behave in India? An attempt is made to assess and verify how the credit-to-GDP gap performs in the Indian context. Chart 1 presents time series of bank credit¹ to GDP ratio and its long-term trend since 1950-51.

Chart 1: Historical Performance of Credit-to-GDP Ratio in India



The trend line is based on the Hodrick-Prescott (HP) filter with $\lambda = 400,000$ (as suggested by the BCBS guidance). Some of the observations of the Chart 1 are as follows: Firstly, in the 1950s, 1960s, 1970s and 1980s, credit-to-GDP ratio was almost close to the trend. Secondly, in the 1990s the credit-to-GDP ratio began slightly deviating from the trend but basically remained below but close to the trend up until 2002-03. Lastly, since 2003-04 the credit-to-GDP ratio remained above the trend and positive deviation widened thereafter.

¹ As India financial sector is basically bank-dominated, bank credit is taken as proxy for private credit. Although non-bank credit in India has grown both in terms of flow and stock, it is felt that this trend is of recent origin (may be in 2000s).

In the light of the above observations, the usefulness of credit-to-GDP ratio as a policy guide in the Indian context is debatable for the fundamental reason that the credit-to-GDP gap did not show any worthwhile variability up until 2002-03 with the standard deviation of the gap during 1950-51 to 2002-03 estimated at just 3.0 {this finding was corroborated by the Financial Stability Report (June 2011) of Reserve Bank of India} though there emerged a significant positive gap since 2003-04 as the standard deviation almost doubled during this the 5-year period. In other words, from a historical perspective, the credit-to-GDP gap was too small to be of any value for policy purposes in the Indian context.

How to rationalize and explain the inapplicability of the BCBS guidance as expounded above? The observed lack of variability in the credit-to-GDP gap in the Indian context till recently is not hard to explain. Informal credit market has dominated the Indian scene over the decades, though the formal credit market has expanded its reach in the meantime. Illustratively, analysis of share of rural household debt by source as revealed by various All India Debt and Investment Surveys is of relevance in this regard. The share of non-institutional agencies, consisting of money lenders, traders, landlords and friends and relatives, in the rural household debt remained more or less stagnant at over 30 per cent during the last 30 years. Just about 40 per cent of the population across India has bank accounts. Further, credit market in India largely remained underdeveloped due to the so-called financial repression reflecting fiscal dominance. The preemption of banking sector resources to fund persistently large fiscal deficits was as high as 63.5 per cent of net demand and time liabilities of all the banks in the early 1990s, though this has waned because of financial sector reforms in the recent decade. Thus, in a historical sense, the credit market in India remained dormant resulting in credit-to-GDP gap being too small to be of any use from the policy perspective.

Thus, on an historical basis (in an *ex post* sense), BCBS guidance is not applicable to India. Besides, it is further argued below that it is not applicable going forward in future either (in the *ex ante* sense). Essentially, BCBS buffer guide implicitly assumes that the long-term trend of the credit-to-GDP ratio is a reliable proxy for the optimal/equilibrium credit required for an economy and any positive/negative deviation denotes excess/deficit credit growth. This is presumably valid in the case of the advanced economies operating generally at equilibrium with

full employment compatible with potential growth and mature and integrated financial markets. Points on the long-term trend line typically signify equilibrium credit market compatible with full employment/potential employment. However, the BCBS capital buffer guide of deviation of credit-to-GDP ratio from its long-term trend is not suitable for India. Fundamentally, rise in credit-to-GDP ratio may be unrelated to any signs of over-leverage in the credit market. The long-term past trend does not represent optimal/equilibrium credit requirements of the Indian economy. Factors which predominantly determine the credit-to-GDP ratio in India in future include various structural drivers viz., structural shift from services to manufacturing (Subbarao, 2011), financial deepening from a low base, rising efficiency of goods markets, rising efficiency of credit markets and policy initiatives to improve flow of credit to sectors like the agriculture, small scale units and infrastructure (Mohan 2006) as elaborated below:

- India is refocusing on positioning manufacturing sector as drivers of growth, going forward. Illustratively, India's New Manufacturing Policy announced in November 2011 aims to grow manufacturing about 3 per cent faster than GDP so that its contribution to GDP can increase from 16 per cent to 25 per cent in the next 15 years. Typically, credit intensity of manufacturing is higher per unit of GDP.
- In India, various segments of the real sector continue to be outside the purview of the formal credit market, funded basically through informal sources of credit, as mentioned earlier. As the process of financial deepening gathers pace and manifests in the form of these segments seeking formal credit, there is a switch in sources of credit from informal to formal.
- India, typical of any EME, is a supply-constrained economy. As the supply constrains ease over time, goods markets tend to become more and more efficient. Rising factor mobility leading to enhanced allocative efficiency is one such manifestation. These improvements in goods markets generally get reflected in structural shifts in supply elasticities, resulting in increasing demand for credit to finance rising production.

- Over time, credit markets in India have become more efficient in intermediating funds between the users and providers of credit, facilitating easier fund mobility at lower transaction costs. In other words, as the cost of intermediation drops, credit off-take rises. Illustratively, the intermediation cost (defined as the spread between cost of deposits and return on loan assets) for the scheduled commercial banks in India consistently fell from 6.24 per cent in 1991-92 to 3.59 per cent in 1999-2000 and further to 3.31 per cent in 2009-10.
- There have been conscious policy initiatives in India to augment credit flow to certain identified sectors including agriculture, small scale units and infrastructure. Illustratively, the Government of India, as part of its strategy to boost agriculture production, announced a package to double the flow of institutional credit to agriculture within three years starting 2004-05. The agricultural credit in fact doubled in 2-year period, as against the stipulated period of three years.

Further, in India, credit demand is also expected to go up due to investment needs of infrastructure and the demand for upscaling financial inclusion. For example, in India credit requirements for the next five years for infrastructure development are estimated at US \$ 1 trillion.

Reflecting these structural determinants, the long-term trend itself would be shifting upwards over time, thereby rendering it less and less useful as a secular benchmark. Consequently, any deviation (positive/negative) from the frequently shifting yardstick loses its theoretical underpinning. Positive deviation *per se* does not necessarily signify over-leverage nor does negative deviation *per se* necessarily denote under leverage. Therefore, credit (including bank and non-bank) growth in India, thus, fundamentally will embody both structural and cyclical components. While it is necessary to address cyclical component through countercyclical capital buffer, structural component, on the other hand, should not be impacted by such buffer. In practice, it is almost impossible to identify and differentiate structural and cyclical components of credit growth. It could, however, be argued that corroborative evidence from other variables could be sought to decipher two components of credit growth. But, this exercise is fraught with the potential risk of adversely impacting the structural component of credit growth. Thus, interpretation of secular movement of

credit-to-GDP ratio *vis-à-vis* its long-term trend will be ambiguous in the context of India. To cap the discussion, it would be apt to quote following extracts:

“The BCBS framework uses the metric 'Credit to GDP ratio' and its upward deviation from the long term trend to signal the need to build up countercyclical capital buffer. This metric is not suitable for Indian economy and other EMEs, as was also pointed out in the Financial Stability Report (FSR) of June 2011, due to structural changes taking place in the economy on account of high growth rate and financial inclusion etc.” (Sinha, 2011)

“In a structurally transforming economy with rapid upward mobility, credit demand will expand faster than GDP for several reasons. First, India will shift increasingly from services to manufactures whose credit intensity is higher per unit of GDP. Second, we need to at least double our investment in infrastructure which will place enormous demands on credit. Finally, financial inclusion, which both the Government and the Reserve Bank are driving, will bring millions of low income households into the formal financial system with almost all of them needing credit. What all this means is that we are going to have to impose higher capital requirements on banks as per Basel III at a time when credit demand is going to expand rapidly. The concern is that this will raise the cost of credit and hence militate against growth” (Subbarao, 2011)

Hence, there is a need for an alternative buffer guide, which can unambiguously mirror the macro-financial environment, especially the leverage conditions, in which banks in India operate. In fact, BCBS proposal (Principle 2) acknowledges the fact that the credit-to-GDP ratio does not need to play a dominant role in the information used by authorities to take and explain buffer decisions. Further, supervisors in each jurisdiction are free to emphasise any other variables and qualitative information that make sense to them for purposes of assessing the sustainability of credit growth and the level of system-wide risk, as well as in taking and explaining buffer decisions. Then, what could be the alternative buffer guide? The next section attempts to address this question.

3. Methodology for an Alternative Capital Buffer Guide for India

As mentioned at the outset, the countercyclical capital buffer should dampen liquidity cycles. The optimal candidate for buffer guide should, therefore, reflect the evolving macro-financial environment associated with the credit growth. In particular, the buffer guide should be able to capture system-wide vulnerabilities and risks associated with what is perceived to be excessive credit growth. Banking business

model in India is basically retail in nature meaning that the **principal** source of funding for the banking business is retail deposit base. This business model has endured over the years, *inter alia*, because for banks in India, dependence on credit risk sensitive purchased sources of funding is limited. This historical dependence of the banks on deposits as a source of funding has inherently imparted an element of built-in stability to the banking sector in India. Against this backdrop, this paper proposes that in the Indian context, any departure from the reliance on deposits to fund credit growth, on a sustained basis, would signal build-up of system-wide risk.

Theoretically it could, however, be argued that the process of financial development in India may involve a trend increase in securitization, which would bias the proposed measure of excessive credit growth. In other words, in the context of pick up in securitization, departure from the reliance on deposits may not necessarily signify over-leverage and thereby rising systemic risk but may instead underscore financial development in the form of diversification of funding sources for banks involving investors like pension funds, insurance companies, etc. In this context, it is essential to note the following: The securitization market in India, at present, is small in size and nascent in stage. In fact, the regulatory framework in India underlying securitization strives to promote orderly development of securitization market. Moreover, India has huge untapped potential rural retail deposit base to harness going forward. It will, therefore, be a long time before securitization markets acquire a critical mass in India. Secondly, any large deviation from the reliance on deposits as a **primary** source of funding on a sustained basis - be it due to securitization – does highlight potential build-up of systemic risk as market liquidity conditions tend to acquire greater influence on the stability of the banking sector. The episode of the failure of Northern Rock in the UK illustrates the case in point. Furthermore, as would be evident later in this Section, the methodology for developing an alternative capital buffer guide has built-in cushion to tolerate and accommodate prudent credit growth funded by non-deposit sources.

Viewed from the above stand point, it is not the credit growth *per se* but the pattern of funding of the credit growth that needs to be the criteria for the conduct of capital buffer operations on the theoretical premise that expansion of the asset-side of the balance sheet of banks (credit growth) supported by increasingly unstable growth of liability-side signifies worsening system-wide risk. Thus, capital buffers

need to be built to protect banks from vulnerabilities arising out of excessive credit growth not *vis-à-vis* GDP but *vis-à-vis* retail deposits.

Against this back drop, rising Credit Deposit Ratio (CDR) overtime could denote increasing system-wide leverage and hence deterioration in macro-financial environment in which banks in India operate. Ideally, the alternative buffer should have to capture the combined movement of absolute and incremental CD ratios.² Absolute CD ratio measures leverage on stock basis, while incremental CD ratio measures leverage on flow basis. However, given the fact that from a purely arithmetic stand point, one is derived from the other, reflecting thereby a strong correlation between the two, use of both absolute CD ratio and the incremental CD ratio deserves a detailed justification.

Incremental CD ratio, in isolation, provides only a partial view of the extent of leverage by the banks. Nor does the absolute CD ratio alone give a complete picture on banks' leverage. The following illustration would underscore the point. Let absolute CD ratio at t_1 be 45 per cent (45/100) and at t_2 57 per cent (68/120). The incremental CD ratio during t_1 and t_2 works out to 115 per cent. However, ICD of 115 per cent does not necessarily signify over-leverage, as it is on the back of a lower absolute CD ratio at t_1 . Higher credit growth during t_1 and t_2 might be supported by an overhang of relatively large deposits at t_1 . To illustrate further, let absolute CD ratio at t_1 be 75 per cent (75/100) and at t_2 be 77.5 per cent (93/120). The incremental CD ratio during t_1 and t_2 works out to 90 per cent. However, ICD of 90 per cent does not necessarily signify under-leverage, as it is on the back of a relatively larger overhang of credit manifest in higher absolute CD ratio at t_1 . Thus, the holistic view of banks' leverage is provided only when the incremental CD ratio is seen in conjunction with the absolute CD ratio.

In fact, historically, credit aggregates – both absolute and incremental - have been amongst the host of variables, forming an integral part of macro-economic and prudential policy formulation in India. In this context, observations by Usha Thorat (2010) assumes relevance:

² The Statutory Liquidity Ratio (SLR) and Cash Reserve Ratio (CRR) requirements in India broadly constitute 30 per cent of net demand and time liabilities.

“Absolute and incremental credit aggregates (including credit deposit ratio) are amongst the host of variables, forming an integral part of macro-economic and prudential policy formulation. In the Indian context, an incremental credit-deposit ratio of more than 100 per cent, when the system itself has a high overall absolute credit deposit ratio (say beyond 70 per cent) is taken as a sign of over-leverage. A prudential focus on credit deposit ratio encourages the banks in India to raise deposits for funding credit flow and minimizes the use of purchased funds”.

Against this theoretical underpinning, the methodology for constructing the alternative buffer guide is enumerated below:

Step 1: Calculate time-series data on both absolute CD ratio (cd_j) and incremental CD (icd_j) ratio.

Step 2: Compute moving maxima of both ' cd_j ' and ' icd_j ' ratios. Smoothing (moving maxima) of the ratios is suggested to account for the possible non-linear impact of the ratios on the conduct of capital buffer operations. Moving maxima is recommended for smoothing to reflect the fact that rising ratios overtime underpin increasing system-wide vulnerabilities in the banking sector. Empirically, it is found that 3-year window offered better fit in terms of the compatibility of the alternative guide with other relevant indicators of real sector and asset prices (for details see below).

Step 3: Construct a moving Maxima of Composite CD Ratio (MAXCCDR) by combining moving maxima of both ' cd_j ' and ' icd_j ' ratios with weights.

Notationally,

let 3-year moving maxima of ' cd_j ' ratio be $\text{Max}_{n-3 < j \leq n}(cd_j)$ for $n = 3, 6, 9, \dots$

let 3-year moving maxima of ' icd_j ' ratio be $\text{Max}_{n-3 < j \leq n}(icd_j)$ for $n = 3, 6, 9, \dots$

then $\text{MAXCCDR}_j = [(w) (\text{Max}_{n-3 < j \leq n}(cd_j)) + (1-w) (\text{Max}_{n-3 < j \leq n}(icd_j))]$, $0 < w < 1$

where w is the weights (for determination of weights please see footnote 5)

The theoretical justification for the use of moving maxima and the determination of weights are as follows:

In the literature on financial time series data analysis, moving maxima is employed especially in the area of Multivariate Extreme Value Theory, which is concerned with the joint distribution of extremes of multiple random variables. Multivariate Extreme Value Theory has applications in banking and finance also wherein extreme events – dependent across different assets – occur in clusters. Estimation of such joint distributions generally involves modeling extreme multivariate events based on Moving Maxima (MM) process and a multivariate extension known as Multivariate Maxima of Moving Maxima (M4) process (Stuart et al 2005 and Chamu Morales 2005).

Further, literature also supports the use of maxima for calibration of macroprudential policy. Davis *et al* (2010), *inter alia*, estimate the impact of capital adequacy and liquidity on probability of financial crisis. In particular, they generate the required maxima for capital adjustment and liquidity adjustment and both together for protecting against banking crisis “anywhere in the world”. Drawing from the work of Davis et al, use of maxima is recommended in this paper for calibrating countercyclical capital buffers.

As regards determination of weights, assigning equal weights to various components of a composite indicator is generally an accepted practice in the literature relating to financial/banking regulation. For instance, BCBS (2011) assigns equal weights to 5 indicators for identification of Globally Systemically Important Banks (G-SIBs). Drawing from this standard practice, ‘ cd_j ’ and ‘ icd_j ’ are assigned equal weights while computing MAXCCDR³.

Thus computed MAXCCRD could be the alternative buffer guide in the Indian context. Statistical details underlying the computation of MAXCCDR is provided in the Annex 1. The theoretical interpretation of MAXCCDR is unambiguous, unlike the credit-deposit ratio. Deviations from the long-term trend of the MAXCCDR (TMAXCCDR) do reflect underlying changes in the macro-financial environment – i.e. leveraged funding conditions - in which banks in India operate. The long-term

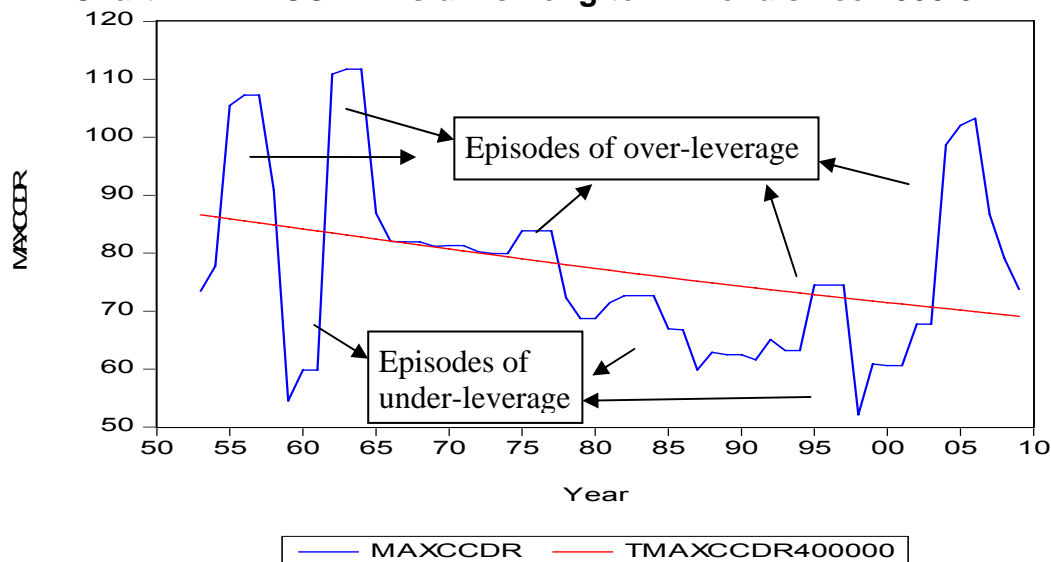
³ Further, an attempt is made by the authors to verify whether differential weights to absolute CD ratio and incremental CD ratio would have varying results. However, it is found that number of identified episodes of over/under leverage do not change, though there are marginal variations to the magnitude of positive/negative gaps. In other words, the secular behaviour and the inflexion points of the credit cycles are by and large robust to the changes in the weights. Thus, changes in weights do not materially matter.

trend is computed using Hodrick –Prescott (HP) filter with λ 400000 with the help of E-Views, as suggested by the BCBS. Actual MAXCCDR being higher than the trend MAXCCDR (Positive gap) depicts the situation wherein the 3-year window moving maxima is higher than the trend MAXCCDR signifying thereby worsening macro-financial environment of over-leveraged⁴ funding conditions. On the other hand, negative gap denotes under-leverage. Next section attempts to present the historical performance of MAXCCDR in the context of Indian banks.

4. Historical Performance of MAXCCDR

The computed MAXCCDR and TMAXCCDR on the basis of the above-methodology, involving data during 1950-51 to 2009-10 is presented in Chart 2.

Chart 2: MAXCCDR vis-à-vis Long-term Trend since 1950-51



Analysis of Chart 2 reveals the following:

- During the last 60 years, banking sector in India operated, by and large, below but closer to the long-term trend. This means that leverage position of Indian banks on a secular basis remained in balance.
- There have been 5 episodes of over leverage (positive gap) during mid-1950s, mid-1960s, mid-1970s, mid-1990s and since 2003-04. Out of these 5

⁴ Deviation of 3-year moving maxima of MAXCCDR from the trend accommodates prudent credit growth funded by non-deposit sources.

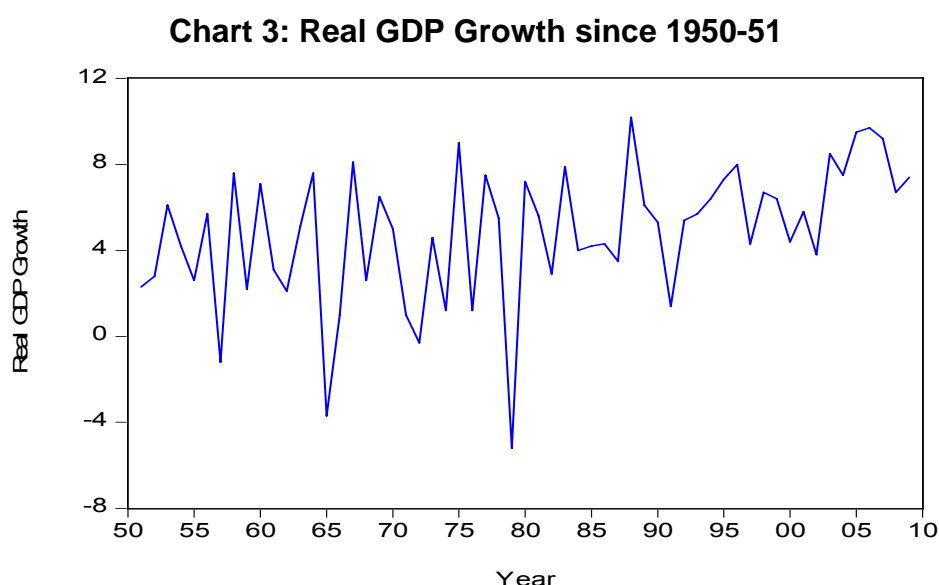
episodes, there were 3 episode of positive gap (during mid-1950s, mid-1960s and since 2003-04) exceeding the long-term trend by a substantial margin.

- There have been 3 episodes of under-leverage (negative gap) during late 1950s, late 1970s to early 1990s and during 1998-99 to 2003-04.
- Till 1965-66, the amplitude of alternate swings of phases of under leverage and over-leverage, as measured by standard deviation at 27.4, was indeed high.
- Since 1965-66 to 1995-96, there has been a discernible moderation in amplitude of credit cycles as standard deviation during this period was estimated at 8.
- Since 1995-96, alternate phases of pronounced under and over-leverage are again apparent as standard deviation rose to 23. There was a brief period of over-leverage during mid-1990s followed by a prolonged period of under-leverage till 2003-04, which was replaced by a phase of over-leverage since then. Meaning, credit cycles have relatively become more pronounced in India since mid-1990s.
- The need for actively managing countercyclical capital buffer has accordingly acquired relevance since 2003-04.

From the above exposition, it could be inferred that the proposed alternative buffer guide is able to track phases of over/under leverage in the banking sector in India. Can, thus, MAXCCDR be taken as lead indicator for capital buffer operations? The BCBS guidance cautions about the potential possibility of misleading signals emanating from the buffer guide and hence recommends looking for evidence as to whether the inferences from the buffer guide are consistent with those of other variables such as real GDP growth, asset prices, etc. So, do the phases of over/under leverage in the banking sector, as identified by the MAXCCDR, correspond/coincide with the phases of over/under-heating in the Indian real sector? In other words, how does the MAXCCDR, as against credit-to-GDP ratio, map and track the performance of the economic activity, as measured by real GDP?

A. MAXCCDR and the Real Sector

The real GDP growth in per cent since 1950-51 is presented in Chart 3.



It is evident from the Chart 3 that till 1990-91, volatility in real GDP growth was indeed very high. The decadal average of real GDP growth and the volatility therein are shown in Table 1 below.

Table 1: Decadal Growth and volatility of real GDP

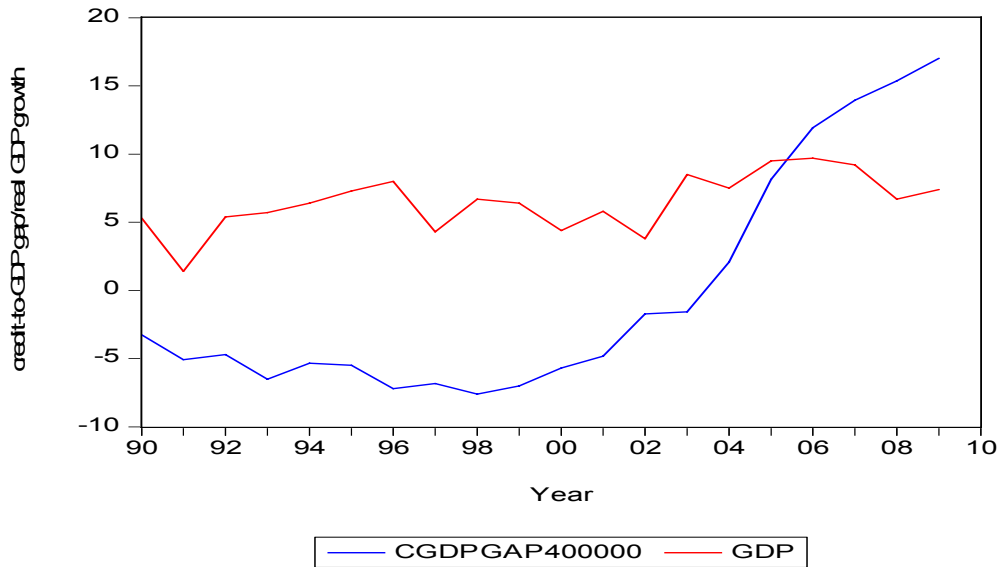
Decade	Average	Standard Deviation
1950s	3.9	2.7
1960s	4.0	3.4
1970s	3.3	4.2
1980s	5.5	2.2
1990s	5.6	1.7
2000s	7.2	2.0

Analysis of MAXCCDR and real GDP growth *vis-à-vis* credit-to-GDP ratio and the real GDP would be attempted on the basis of the data since 1990-91 for the following reasons:

- High volatility in real GDP growth prior to 1990-91,
- The higher trajectory of real growth of GDP thereafter on the back of the economic reforms ushered-in since 1990-91, and
- Increasing contribution of bank credit to real GDP growth reflecting reduction of preemption of resources of the banks in the aftermath of the introduction of financial sector reforms since 1990-91,

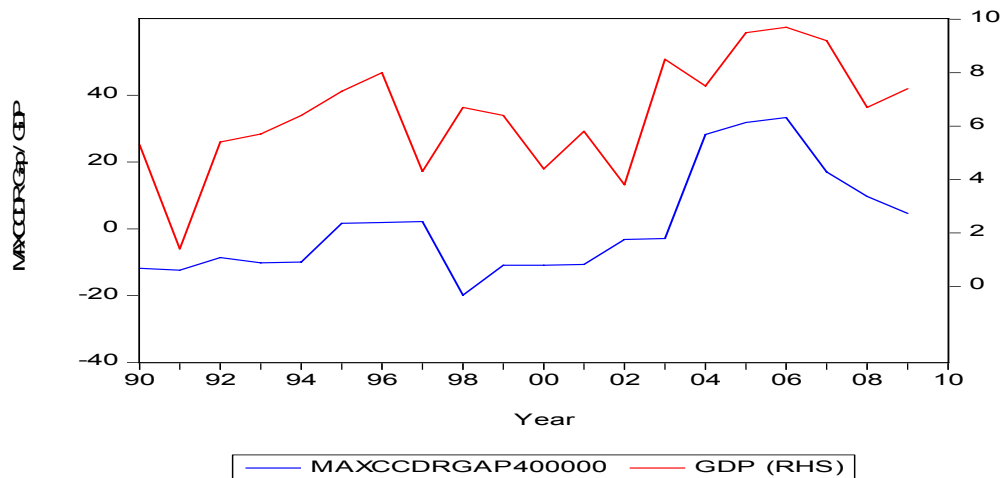
The Chart 4 presents credit-to-GDP gap (ratio minus the trend) and the real GDP growth during 1990-91 to 2009-10.

Chart 4: Credit-to-GDP gap and Real GDP Growth (in per cent) since 1990-91



The Chart 5 presents MAXCCDR gap and the real GDP growth during the same period.

Chart 5: MAXCCDR Gap and GDP since 1990-91



Based on Chart 4 and Chart 5, the following observations are indeed striking:

Firstly, there is a discernible lack of co-movement (synchronisation) between the credit-to-GDP gap and the real GDP growth. On the contrary, there is a clear co-movement (synchronisation) between the MAXCCDR gap and the real GDP growth. Secondly, the correlation coefficient between credit-to-GDP gap and the real growth in GDP, apart from being extremely sensitive to the choice of the start and end dates, has a negative bias in general. On the contrary, and the correlation coefficient

between the MAXCCDR gap and the real growth in GDP, apart from being robust to the choice of the start and end dates, has been an unambiguous positive as shown in Table 2 below.

Table 2: Credit-to-GDP gap and real GDP growth versus MAXCCDR gap and real GDP growth: Correlation Coefficient

	Credit-to-GDP gap and GDP	MAXCCDR gap and GDP
1990-91 to 2009-10	0.53	0.66
1990-91 to 2003-04	-0.08	0.24
2004-05 to 2009-10	-0.13	0.69

Similar observations are evident if real GDP growth is replaced with real GDP gap (difference between real GDP growth and the long-term trend based on HP filter with $\lambda = 400,000$) as can be seen from the Table 3 below:

Table 3: Credit-to-GDP gap and real GDP gap versus MAXCCDR gap and real GDP gap: Correlation Coefficient

	Credit-to-GDP gap and GDP gap	MAXCCDR gap and GDP gap
1990-91 to 2009-10	0.38	0.57
1990-91 to 2003-04	-0.13	0.22
2004-05 to 2009-10	-0.23	0.76

The fundamental implication of these observations is that credit-to-GDP ratio has a procyclical bias. It would call for release of additional capital when real GDP growth accelerates and it would call for build up of additional capital when the real GDP growth decelerates as is evident from Chart 4. Illustratively, during the 3-year period of 2006-07 to 2008-09, real GDP growth decelerated from 9.7 per cent in 2006-07 to 9.2 per cent in 2007-08 and further to 6.7 per cent in 2008-09. During these years, credit-to-GDP gap rose from 11.9 per cent to 14.0 per cent and further to 15.4 per cent. Following BCBS guidance, countercyclical capital buffer would have hit the upper limit of 2.5 per cent of the risk-weighted assets. On the contrary, MAXCCDR gap during this period fell from 33.4 per cent to 17.1 per cent and further to 9.8 per cent calling for release of countercyclical capital buffers. These findings are in agreement with those of Repullo and Saurina (2011) who have examined the applicability of BCBS guidance to select advanced economies. According to them the basic drawback of the credit-to-GDP ratio is as follows:

“The problems with the credit-to-GDP gap variable may be traced to the following two sources. First, there is the empirical regularity that credit usually lags the business cycle In particular, in downturns the credit-to-GDP ratio continues to be high due to greater credit demand by households and firms (making use of credit lines, partly to finance inventory accumulation) and a slower, sometimes even negative, GDP growth. Second, the use of deviations of the credit-to-GDP ratio with respect to its trend compounds the problem, because it takes some time before the ratio crosses the trend line”.

We are in total agreement with the above argument. As is evident from the Chart 5 and the above results of coefficient of correlation, MAXXCDR gap apparently does not suffer from these flaws. Further, from an Indian perspective, as explained earlier, credit-to-GDP gap may call for additional capital requirements even if credit growth (the numerator) is driven by structural factors. MAXXCCDR gap does not curtail credit growth in so far as it is financed by a stable source of funding. Thus, MAXXCD is not only countercyclical, but also accommodates structural drivers of credit growth.

B. MAXCCDR and the Asset Markets

How does MAXCCDR (vis-à-vis credit-to-GDP ratio) map the asset market behavior? Does the phase of over/under-leverage in the banking sector, as measured by MAXCCDR gap, reflect asset price movements? This analysis is carried out involving data during 1990-91 to 2009-10. In this paper, return on Bombay Stock Exchange’s 30-stock benchmark *Sensex* is taken as a proxy for asset prices. Chart 6 presents performance of actual asset prices (*Sensex* returns) vis-à-vis credit-to-GDP gap and Chart 7 presents actual asset prices (*Sensex* returns) vis-à-vis MAXCCDR gap.

Chart 6: Credit-to-GDP gap and Sensex Return

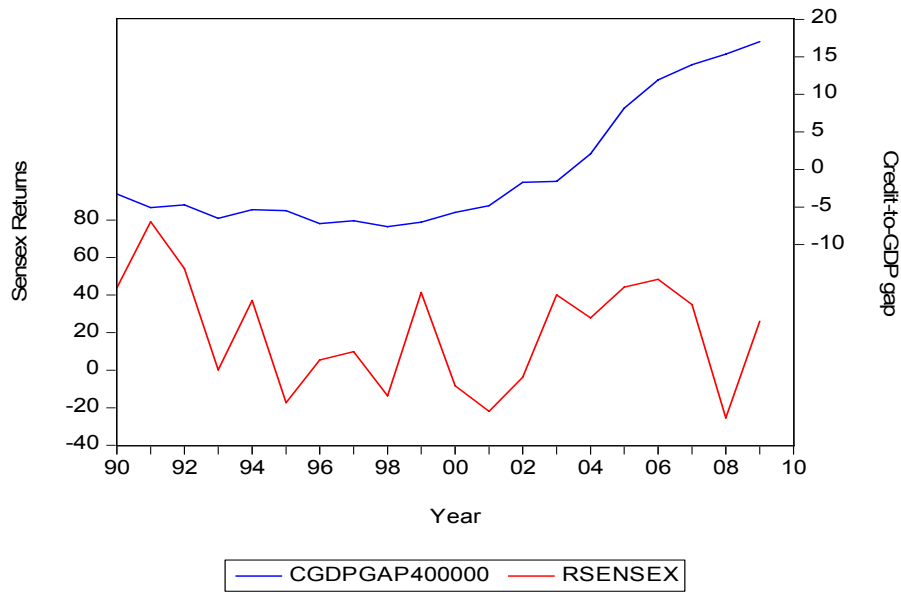
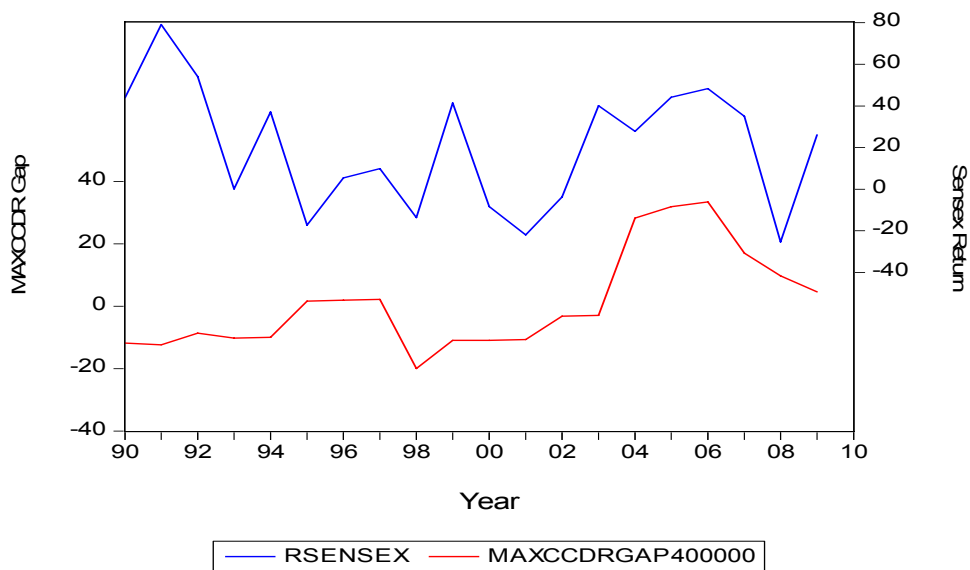


Chart 7: MAXCCDR gap and the Sensex Returns



It is obvious from the Chart 6 and Chart 7 that there is a relatively better co-movement (synchronisation) between MAXCCDR gap and Sensex return than between credit-to-GDP gap and Sensex return, especially in the 2000s. These graphical observations are supported by the relevant coefficients of correlation as shown in Table 4 below.

Table 4: Credit-to-GDP gap and Sensex Return versus MAXCCDR gap and Sensex Return: Correlation Coefficient

	Credit-to-GDP gap and Sensex	MAXCCDR gap and Sensex
1990-91 to 2009-10	0.11	0.18
1990-91 to 2003-04	0.23	-0.16
2004-05 to 2009-10	-0.33	0.63

Similar observations are evident if Sensex returns is replaced with Sensex return gap (difference between Sensex returns and the long-term trend based on HP filter with $\lambda = 400,000$) as can be seen from the Table 5 below:

Table 5: Credit-to-GDP gap and Sensex gap versus MAXCCDR gap and Sensex gap: Correlation Coefficient

	Credit-to-GDP gap and Sensex gap	MAXCCDR gap and Sensex gap
1990-91 to 2009-10	0.26	0.30
1990-91 to 2003-04	0.27	-0.15
2004-05 to 2009-10	-0.28	0.59

Based on the above analysis, it can be inferred that MAXXCDR gap is in relatively better sync with asset price movements than the credit-to-GDP gap.

To sum up, inferences about credit cycle from MAXCCDR are cross-verified for an evidence of consistency and support from the behavior of the proxies representing the real sector and the asset market. The graphical analysis and the measures of correlation coefficient corroborate the inferences about the credit cycles from the MAXCCDR. Thus the historical performance of the MAXCCDR proved to be reliable.

C. Determination of Lower and Upper Triggers of MAXCCDR

The next step is to determine lower and upper threshold triggers for build up and release of capital buffer for Indian banks. The BCBS guidance contains criteria for determination of such triggers:

Criteria for the minimum threshold (L) when the guide would start to indicate a need to build up capital

(1) *L* should be low enough, so that banks are able to build up capital in a gradual fashion before a potential crisis. As banks are given one year to raise additional capital, this means that the indicator should breach the minimum at least 2-3 years prior to a crisis.

(2) *L* should be high enough, so that no additional capital is required during normal times.

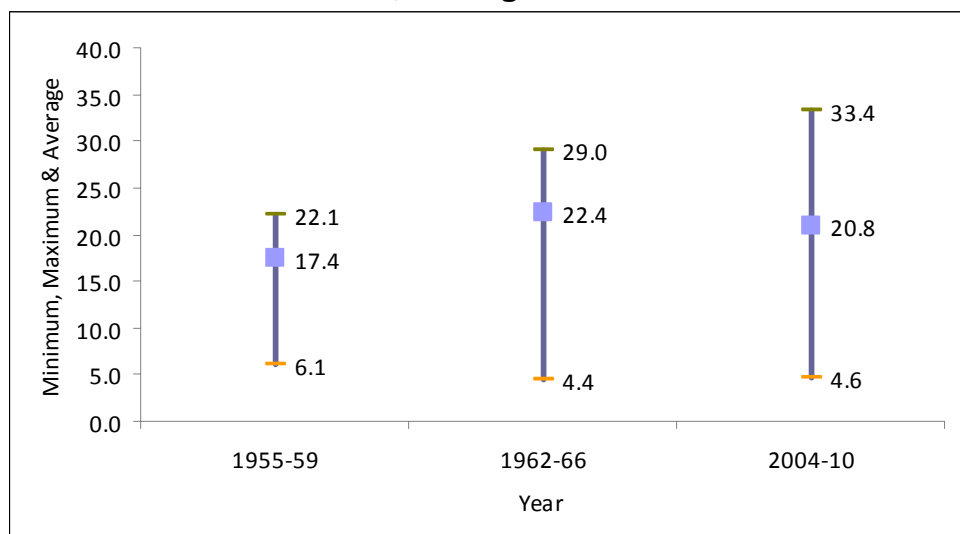
Criteria for the maximum (H) at which point no additional capital would be required, even if the gap would continue to increase

(3) *H* should be low enough, so that the buffer would be at its maximum prior to major banking crises.

The BCBS criteria/rationale are the broad principles for the determination of lower and upper threshold triggers for build up and the release and are valid across jurisdictions. For the purpose of fixing the thresholds, behaviour of the credit-to-GDP gap in the run up to the banking crises was analysed by the BCBS. It was generally observed that gap exceeding 10 per cent on a sustained basis presaged the banking crisis. On the basis of this observation, the maximum threshold has been fixed by the BCBS at 10 per cent gap. To ensure that Criterion 1 is met, *L* has been set at 2 so that the rule would have required the build up of capital for all major banking crises 2-3 years in advanced economies.

The practical difficulty of applying BCBS guidance for determining 'L' and 'H' in the Indian context is that India has not suffered any banking crisis so far and hence it is not possible to observe the behaviors of MAXCCDR gap in the run up to the crisis. Instead, analysis of percentage positive deviation of the MAXCCDR from its long-term trend during the pronounced 3 over-leveraged periods (1955-56 to 1958-59, 1962-63 to 1965-66 and 2004-05 to 2009-10) in the last 60 years in India, as presented in Chart 8, indicates that average was around 20 per cent during the 3 episodes of over-leverage and reached a maximum of 33.4 per cent (the maximum reached during any episode of over-leverage during the last 60 years).

Chart 8: MAXCCDR positive gap during episodes of over-leverage: Minimum, Average and Maximum



Thus, countercyclical capital buffer may kick-in once the MAXCCDR positive gap exceeds the historical average of 20 per cent and increase linearly to reach the maximum of 2.5 per cent of the risk-weighted assets once the positive MAXCCDR gap reaches 33 per cent.

5. Concluding Observations

While acknowledging the fact that supervisors in each jurisdiction are free to rely on any capital buffer guide and qualitative information that make sense to them for purposes of assessing the phase of the credit cycle and the associated level of system-wide risk, BCBS recommends credit-to-GDP as the preferable buffer guide for operating countercyclical capital buffer. This paper attempts to explain why the BCBS buffer guide is not suitable for India, both in ex post and ex-ante senses, and suggest an alternative buffer guide, namely MAXCCDR, which is a smoothed (moving maxima) composite credit deposit ratio. The paper empirically verifies the historical performance of the MAXCCDR both through graphical analysis and the measure of correlation coefficients in tracking credit cycles in India and finds evidence of support and consistency from the behavior of the real sector and the asset markets.

Before we conclude, it needs, however, to be noted that the paper does not claim to have found the single indicator capable of guiding buffer decisions (both build up and release) in India. All indicators provide false signals. Thus, no fully rule-

based mechanism is perfect. Some degree of judgment, both for the build-up and particularly for the release phase, would be inevitable when setting countercyclical capital buffers in practice. That said, it is absolutely imperative that incorporation of judgment should be one in a manner that reflect transparency and accountability of the policymakers.

Computation of MAXCCDR: Statistical Details

Year	Bank Credit (C)	Aggregate Deposits (D)	CD	ICD	MaxCD (3-year moving window)	MaxICD (3-year moving window)	Weighted MAXCD	Weighted MAXICD	MAXCCDR
1953-54	538	848	63	56	64	83	31.8	41.7	73.5
1954-55	623	943	66	89	66	89	33.0	44.7	77.8
1955-56	761	1043	73	138	73	138	36.5	69.0	105.5
1956-57	900	1175	77	105	77	138	38.3	69.0	107.3
1957-58	963	1452	66	23	77	138	38.3	69.0	107.3
1958-59	1014	1635	62	28	77	105	38.3	52.7	90.9
1959-60	1128	1902	59	43	66	43	33.2	21.3	54.5
1960-61	1336	1736	77	-125	77	43	38.5	21.3	59.8
1961-62	1408	1917	73	40	77	43	38.5	21.3	59.8
1962-63	1588	2042	78	144	78	144	38.9	72.0	110.9
1963-64	1817	2285	80	94	80	144	39.8	72.0	111.8
1964-65	2035	2583	79	73	80	144	39.8	72.0	111.8
1965-66	2287	2950	78	69	80	94	39.8	47.1	86.9
1966-67	2692	3425	79	85	79	85	39.4	42.6	82.0
1967-68	3032	3856	79	79	79	85	39.3	42.6	81.9
1968-69	3396	4338	78	76	79	85	39.3	42.6	81.9
1969-70	3971	5028	79	83	79	83	39.5	41.7	81.2
1970-71	4684	5906	79	81	79	83	39.7	41.7	81.3
1971-72	5263	7106	74	48	79	83	39.7	41.7	81.3
1972-73	6115	8643	71	55	79	81	39.7	40.6	80.3
1973-74	7399	10139	73	86	74	86	37.0	42.9	79.9
1974-75	8762	11827	74	81	74	86	37.0	42.9	80.0
1975-76	10877	14155	77	91	77	91	38.4	45.4	83.8
1976-77	13173	17566	75	67	77	91	38.4	45.4	83.8
1977-78	14939	22211	67	38	77	91	38.4	45.4	83.8
1978-79	18285	27016	68	70	75	70	37.5	34.8	72.3
1979-80	21537	31759	68	69	68	70	33.9	34.8	68.7
1980-81	25371	37988	67	62	68	70	33.9	34.8	68.7
1981-82	29682	43733	68	75	68	75	33.9	37.5	71.5
1982-83	35493	51358	69	76	69	76	34.6	38.1	72.7
1983-84	41294	60596	68	63	69	76	34.6	38.1	72.7
1984-85	48953	72244	68	66	69	76	34.6	38.1	72.7
1985-86	56067	85404	66	54	68	66	34.1	32.9	67.0
1986-87	63308	102724	62	42	68	66	33.9	32.9	66.8
1987-88	70536	118045	60	47	66	54	32.8	27.0	59.9
1988-89	84719	140150	60	64	62	64	30.8	32.1	62.9
1989-90	101453	166959	61	62	61	64	30.4	32.1	62.5
1990-91	116301	192541	60	58	61	64	30.4	32.1	62.5
1991-92	125592	230758	54	24	61	62	30.4	31.2	61.6
1992-93	151982	268572	57	70	60	70	30.2	34.9	65.1
1993-94	164418	315132	52	27	57	70	28.3	34.9	63.2
1994-95	211560	386859	55	66	57	70	28.3	34.9	63.2
1995-96	254015	433819	59	90	59	90	29.3	45.2	74.5
1996-97	278401	505599	55	34	59	90	29.3	45.2	74.5

Year	Bank Credit (C)	Aggregate Deposits (D)	CD	ICD	MaxCD (3-year moving window)	MaxICD (3-year moving window)	Weighted MAXCD	Weighted MAXICD	MAXCCDR
1997-98	324079	598485	54	49	59	90	29.3	45.2	74.5
1998-99	368837	714025	52	39	55	49	27.5	24.6	52.1
1999-00	435958	813345	54	68	54	68	27.1	33.8	60.9
2000-01	511434	962618	53	51	54	68	26.8	33.8	60.6
2001-02	589723	1103360	53	56	54	68	26.8	33.8	60.6
2002-03	729215	1280853	57	79	57	79	28.5	39.3	67.8
2003-04	840785	1504416	56	50	57	79	28.5	39.3	67.8
2004-05	1100428	1700198	65	133	65	133	32.4	66.3	98.7
2005-06	1507077	2109049	71	99	71	133	35.7	66.3	102.0
2006-07	1931189	2611933	74	84	74	133	37.0	66.3	103.3
2007-08	2361914	3196939	74	74	74	99	37.0	49.7	86.7
2008-09	2775549	3834110	72	65	74	84	37.0	42.2	79.1
2009-10	3244788	4492826	72	71	74	74	36.9	36.8	73.8

Source: Calculated by the authors based on the data from Handbook of Statistics on Indian Economy 2010-11.

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