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Business Cycles Approach to Dynamic Provisioning: An Indian Case Study

Tulasi Gopinath
and
Thangjam Rajeshwar Singh

DEPARTMENT OF ECONOMIC AND POLICY RESEARCH
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Abstract

There is a broad consensus in the literature that the financial system is procyclical in nature. The procyclicality of the financial system accentuates the phases of booms and busts of the business cycle with severe spillover implications for the real economy. In the wake of the recent global financial crisis, addressing procyclicality of the financial system occupied centre-stage of policy concern for many central banks and financial regulators. This paper attempts to develop a model for rule-based approach to the conduct of dynamic provisioning in India. In India, bank credit of scheduled commercial banks is empirically found to trail the quarterly GDP growth rate during the sample period of 1997 to 2013. Therefore, a model based on GDP growth rate cycle as against the credit cycle could render a better forward looking approach to dynamic provisioning. The rules of dynamic provisioning of the model proposed in this paper are based on real GDP growth rate cycles and the dynamic provisioning is activated when smooth-over-the-cycle GDP growth rate exceeds a certain threshold reflecting the potential output growth. Further, the model also accommodates rules for dynamic provisioning based on inflection points of the business cycle when the economy is in the phase of high economic growth.

JEL Classification: E30, E32, G28

Key Words: Dynamic Provisioning, Potential Growth, Threshold, Activation, Deactivation, State of the Economy, Inflection Point.

[@] Tulasi Gopinath (email) is a Director, Department of Economic and Policy Research, New Delhi and Thangjam Rajeshwar Singh (email) is an Assistant Adviser, Department of Statistics and Information Management, Reserve Bank of India. The authors thank A.K. Choudhary, General Manager, Department of Banking Operations & Development for prompting them to work on the subject. Views are personal and usual disclaimers apply.

Business Cycles Approach to Dynamic Provisioning:
An Indian Case Study

Introduction

There is a broad consensus in the literature that the financial system is inherently procyclical on account of variety of reasons: "financial-instability hypothesis (Kindleberger (1978) and Minsky (1982); herd behavior (Rajan 1994; Devenow and Welch 1996); principal-agency problem (Williamson 1963); lack of institutional memory (Berger and Udell (2003)); and financial regulation itself (Saurina and Trucharte (2007); Repullo et al (2009) and Borio et al (2001)). This inherent nature of procyclicality of the financial system has accentuated the phases of booms and busts of the cycle with severe adverse spillover implications for the real economy.

The experience in the context of the recent global financial crisis, in particular, has triggered a debate as to the tools, which could potentially mitigate the procyclical tendencies of the financial system. Capital and provisions are among the broad tools considered for the purpose. Both tools could help to dampen excess credit growth during an expansion. Tool of capital, raises the cost of *credit* reducing its demand. Tools of provisions, by requiring banks to hold higher provisions, reduces the resources available for funding loans and help restrain credit growth (Gilbert Terrier *et al*, 2011). In the aftermath of the recent crisis, considerable progress has been made in recommending the capital buffer, a crucial part of Basel III, as a tool to address procyclicality.

On the other hand, dynamic provisioning (DP), as a tool for mitigating procyclicality, has been in vogue even before the crisis. Spanish dynamic provisioning, introduced in 2000, is a case in point. In addition, there have been various approaches to the dynamic provisioning including Uruguayan approach introduced in 2001, Colombian approach in 2007 and Peruvian and Bolivian approaches in 2008. In fact, dynamic provisioning is one of the alternative approaches recommended by the then Financial Stability Forum (2009) for recognizing and measuring loan losses that incorporate a broader range of credit information. The Reserve Bank of India has issued a Discussion Paper on dynamic provisioning in 2012 proposing an Indian variant of the approach to the subject.

Against this backdrop, this paper attempts to showcase a model of dynamic provisioning for India, relying exclusively on business cycles, measured in terms of

real GDP[1]. Advantages associated with relying in GDP rather than with credit are: it is empirically found that credit trails GDP. Hence, targeting GDP could tend to be more countercyclical than targeting credit. Further, from an EMEs perspective in general and Indian perspective in particular, credit growth *per se* need not signal emerging financial imbalances due to structural factors.

The rest of the paper is organized into 6 sections. Section II briefly introduces the conceptual underpinnings of dynamic provisioning as an approach, contrast to that of normal provisioning. Section III discusses methodologies adopted in various jurisdictions for the conduct of dynamic provisioning including Spain, Uruguay, Columbia, Bolivia, and Peru. Section IV develops the theoretical model for the conduct of dynamic provisioning in India. Section V estimates the model and showcases the dynamic provisioning rules for India using quarterly GDP data. Section VI back tests the model vis-à-vis the timing of time-varying provisioning requirements introduced in India from time to time since 2004 based on the regulatory judgment. Section VII concludes the paper.

Section II: Concept of Dynamic Provisioning

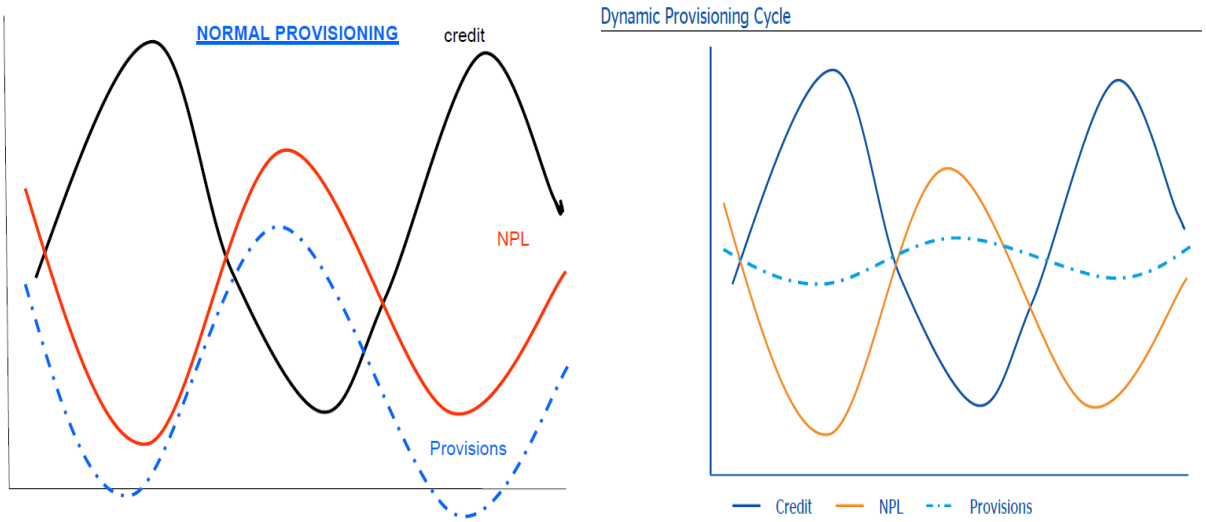
In this section, attempt is made to understand the concept of dynamic provisioning. Under normal provisioning scenario, provisions are a function of realized losses/incurred losses. In other words, there is a sort of linear relationship between incurred losses and provisions. Provisions rise if losses increase and vice versa. Thus during the boom time characterized by accelerating GDP growth, credit tends to rise. Reflecting all pervasive optimism arising out of favourable business conditions, debtors are able to repay loans promptly. As a result, incurred losses by banks tend to fall and accordingly, provisions tend to fall. On the other hand, during stress times, the opposite happens. GDP growth slows down on the back of deteriorating business environment/confidence. Credit growth decelerates and borrowers find it difficult to repay loans due to which incurred losses by banks mount. Provisions for rising losses, accordingly, increase. Hence, normal provisions are procyclical.

On the other hand, dynamic provisioning framework intends to make provisions a function of expected losses (Mahapatra, 2012) by smoothing provisions along the cycle by advocating a through-the-cycle- approach, as against the point-in-

[1] Non-Agriculture GDP is used as the reference series for business cycles analysis in India since the agricultural sector depends on monsoon performance and due to which GDP is highly volatile (RBI, 2006). However, for the purpose of developing dynamic provisioning model in this paper, the real GDP is used for measuring the business cycles as banks provided loan to agricultural sector.

time approach underlying normal provisions. How much smoothening is necessary is a question of choice and judgment. Generally, the objective is to have a stable ratio of provisions to credit over the cycle. The chart below would illustrate the conceptual difference between the normal provisioning and dynamic provisioning.

Chart 1: Normal vs Dynamic Provisioning: Stylised Illustration



Source: Santiago, et al (2012)

Section III: Select Country Approaches to Dynamic Provisioning[#]

Spain was the first country to put in place a framework for dynamic provisions in 2000. Following Spain, many Latin American countries implemented their approaches to dynamic provisioning (DP). In this section, a brief summary of approaches to DP adopted in Spain, Uruguay, Colombia, Bolivia and Peru is presented.

Spanish Approach

Though Spanish framework was first introduced in 2000, it was modified in 2004. For the purpose of this paper, the modified version is reviewed. The Spanish dynamic provisions formula builds general provisions that account for expected losses in new loans extended in a given period and the difference between average of specific provisions made during the business cycle and the current level of specific provisions. The formula is as follows:

$$GP_t = \sum_{k=1}^{N} (\alpha^k \Delta C_t^k + \beta^k C_t^k - SP_t^k)$$

[#] Material on these approaches is basically drawn from Gilbert Terrier et al, (2011) and Santiago, et al (2012).

where α^k is the average credit losses during a business cycle for k^{th} type of loan ($k = 1,2,\ldots,N$), β^k is the average specific provisions during a business cycle for k^{th} type of loan, C_t^k is the credit for k^{th} type of loan at time t and SP_t^k denote the current level of specific provisions for *kth* loan at time *t*. It is apparent from the above formula that second term denotes historical specific provisions over a business cycle and third term is the specific provisions at a current point in time. In a boom time, the difference between the second and third terms is positive, and in stress times, negative, imparting dynamism to the provisioning process over time. The Spanish approach specifies floor and ceiling to the general provisions as follows:

$$33\% < \sum_{k=1}^{N} \alpha^k C_t^k > 125\%$$

Thus, under Spanish DP framework, total provisions made during the year is the sum of general provision (GP) and specific provision (SP) i.e $GP_t + SP_t$

Uruguayan Approach

The regulation specifies that banks contribute to their individual dynamic provisioning funds, DPt, which is the difference between the monthly statistical net losses on loans and the realized net losses in that month and is given by:

$$\Delta \mathrm{DP_t} = \sum_{\mathrm{k=1}}^{5} \frac{1}{12} \alpha^{\mathrm{k}} \mathrm{C_t^k} - \mathrm{LL_t}$$

Where α^k is the statistical loss ratio calculated on historical basis for k^{th} loan, C_t^k is loan volume for k^{th} loan type and LL_t is the incurred loss in a given period *t* (time period *t* is monthly). The DP_t fund of each bank is bound between 0 and 3 of loans to be provisioned.

Columbian Approach

Colombia adopted dynamic provisions for commercial and consumer loans in 2007. Banks can measure credit risk of loans using either the regulatory reference model or approved proprietary models. However, at present all banks are using the reference model. The regulatory model prescribes three types of tax-deductable provisions: individual, countercyclical and general provisions. General provisions should at least be equal to 1 per cent of total loans and can be used to meet countercyclical provisions. Countercyclical provisions cover credit risk from changes in the borrower's creditworthiness due to changes in economic cycle. Countercyclical provisions are treated as special type of specific individual provisions.

The regulator, based on historical data, computes two risk scenarios, matrix A and matrix B, where matrix B is a riskier scenario. Two default probability matrixes of

credit type by borrower are generated. Based on expected losses, provisions are calculated as follows:

$$P = OVL * PD * LGD$$

Where P is provisions, OVL is outstanding value of loan, PD is probability of default, and LGD is loss given default. Each year, regulators decide which matrix to use to determine the accumulation of individual provisions. During the years of high credit growth, Matrix A is used for calculating individual provisions of each of the banks and the matrix B is used to compute riskier scenario provisions and the countercyclical provisions of each bank is equated to the difference between the individual provisions based on matrix A and the riskier provisions based on matrix B. During stress periods, individual provisions are calculated on the basis of matrix A and there is no accumulation of countercyclical provisions. Further, the accumulated provisions could be drawn down in stress times. Till 2010, there was no objective methodology and the regulator, based on subjective judgment, used to declare "change of status" with regard to the use of the provisions. However, since April 2010, an objective methodology has been put in place to determine the "change of status". This methodology comprises the following four indicators of deterioration of the portfolio, efficiency, stability, and credit growth. These indicators are defined as follows:

1. Deterioration of the portfolio, based on the variation of individual provisions (P_t)

   Δ Provisions = $(P_t / P_{t-3}) - 1 \geq 9\%$

2. Efficiency: PNR / IC ≥ 17%, where PNR is provisions net of recoveries and IC is interest income

3. Stability: 0 ≤ (PNR / MFBa) ≥ 42%, where PNR is provisions net of recoveries and MFBa is operational margin before depreciation and amortization plus provisions net of recoveries of the credit and leasing portfolio

4. Growth credit portfolio

   $\Delta CB = (CB_t – CB_{t-1}) – 1 < 23\%$, where CB is credit portfolio

The indicators are defined in such a way as to indicate the downturn of the cycle. For each of them, there are precise reference values that trigger the suspension of the accumulation mode. In the default situation, if any of the four indicators is not met, the entity will be subject to accumulation of countercyclical provisions (this will correspond to the cyclical upturn). If the four indicators are met for 3 consecutive months, the entity will enter the depletion phase, where the accumulated provisions are run down (this will correspond to the downturn of the cycle) (Santiago, et al (2012)). Further, when the depletion mode is on, for calculating individual provisions of each bank, while matrix A applied to best credit

quality loans, matrix B is applied to lower credit quality loans. Meaning, even in downturn, the provisioning requirements of lower quality loans are relatively stringent.

Bolivian Approach

Banks are required to maintain a dynamic provision in the range of 1.5 per cent to 5.5 per cent of total loans, depending on the type of loan. Banks can access the provision stock to offset upto half of the additional specific provisions required in a given month provided that the loan quality has deteriorated for six consecutive months and the dynamic provision has been fully phased in.

Peruvian Approach

The Peruvian regulators have set a rule based on GDP growth. Under this approach, the countercyclical provisioning rule requires Peruvian banks to build up additional minimum provisions whenever the rule is activated by one of the conditions below:

a) the annualized average percent change of GDP during the past 30 months reaches or exceeds 5 percent from below;

b) the annualized average percent change of GDP during the past 30 months is above 5 percent and the average annualized percent change of GDP during the past 12 months exceeds by 2 percentage points its value one year before;

c) the annualized average percent change of GDP during the past 30 months is above 5 percent and 18 months have elapsed since the rule was deactivated by second deactivation condition.

Countercyclical provisions are deactivated by one of the two conditions below:

a) the annualized average percent change of GDP during the last 30 months falls to or below 5 percent;

b) the annualized average percent change of GDP during the last 12 months is lower by at least 4 percentage points than its value one year before.

As is evident from the select country practices, fundamentally, dynamic provisioning framework is premised on better understanding of the business cycles as it advocates an inter-temporal approach. While majority of the methodologies for dynamic provisioning adopted across jurisdictions rely on banking data involving credit and loss history, there is an alternative methodology using macro-economic data, especially real GDP (Peruvian approach). In the following section, an attempt is made to develop a similar model for India using real GDP data.

Section IV: The Proposed Methodology for Dynamic Provisioning

This section attempts to develop a model of business cycle based approach to dynamic provisioning in India. The conceptual ideas of the proposed model are drawn from the experience of Peruvian model, which is explained in the earlier section.

Burns and Mitchell (1946) defined the classical definition of business cycles as, "*Business cycles are a type of fluctuations found in the aggregate economic activity of nations that organize their work mainly in business enterprises: a cycle consist of expansion occurring at about the same time in many economic activities, followed by similarly general recessions, contractions and revivals which merge into the expansion phase of the next cycle; this sequence of changes is recurrent but not periodic. In duration, business cycles vary from more than a year to ten or twelve years; they are not divisible into shorter cycles of similar character with amplitudes approximating their own*".

Generally, the widely accepted single data series representing the notion of 'aggregate economic activity' of a country is GDP. In the literature, there are basically three different approaches to analyse the business cycle, *viz.*, Classical Cycles, Growth Cycles and Growth Rate Cycles. The Classical business cycle measures the ups and downs in the absolute levels of many economic activities at about the same time in an economy. Growth cycle tracks the upswings and downswings through deviations of the actual growth rate of the economy from its long-run trend of growth. On the other hand, Growth rate cycles are the simple cyclical upswings and downswings in the growth rate of the economic activity, which has become very popular in recent years in the analysis of business cycles. The growth rates are estimated as the simple annual point-to-point growth rates *viz.,* same-month-year-ago, same-quarter-year-ago changes.

Literature on business cycles documents that there are instances wherein classical measure of business cycle could throw out wrong signals in identifying recession of the business cycle phases (Dua and Banerji, 1999). While growth cycle is more suitable for historical analysis, growth rate cycle is more appropriate for real time monitoring and forecasting (Klein, 1998). Therefore, in this paper, growth rate cycle is analyzed. The model formulated in this paper is based on the quarterly real GDP growth rate cycle and the dynamic/cyclical provisioning is activated / deactivated when the rate of growth of real GDP exceeds /falls below a certain threshold level, basically reflecting the potential output growth.

The Model

Suppose, the growth rate cycle of real GDP as measured by same-quarter-year-ago be denoted by g_t, where *t = 1, 2, 3… N* is the time series. As the estimated growth rate cycles are expected to be quite volatile, smoothing is carried out to eliminate short-term fluctuation in the cycles through the application of moving average method for dating business cycles. But smoothing a series runs a certain risk of distorting the pattern, especially the timing (Zarnowitz *et al* (2006)). Therefore, in order to reduce the shift in the timing, centered equal weighted moving average method is used for smoothing. For odd period *m = 2p+1,* for *p = 1, 2, 3… P*, the centered *m*-period moving average[2] of real GDP growth rate cycles, denoted by Y_t is defined as:

$$Y_t = \frac{1}{m} \sum_{j=-(m-1)/2}^{(m-1)/2} g_{t+j}$$

where, *m* is the length of the moving average period which is less than one year.

Let the average duration of business cycle period be *T*, the evolution of business cycle over time denoted by A_t is defined as smooth-over-the-cycle GDP growth rate and for odd *T = 2q+1*, for *q = 1, 2, 3,…,Q,* period of cycle, A_t is expressed as:

$$A_t = \frac{1}{T} \sum_{i=-(T-1)/2}^{(T-1)/2} g_{t+i}$$

The smoothing of the time series using the above moving average method does not allow estimates of Y_t and A_t near the beginning and end of the time series (at first *p (q)* and last *p (q)* points for Y_t and A_t). For analysing the most recent data for policy purposes, an outlook/an estiamte on additional *p (q)* data points on growth rate of real GDP is needed (i.e. information on GDP growth rate at *N+1, N+2, …, N+p(q)* time point). Such additional information could be sourced either by forecasting or from other sources.

The dynamic provisioning is activated/deactivated based on whether the smoothen series of real GDP growth rate over the cycle period *T* represented by A_t

[2] A centered average is calculated in the same way as the simple moving average, except the point of the centered average is plotted at the center of the specified look back period. In the case of a centered average with an even number of look back period, the center point is plotted at the point immediately to the right of the center and is formulated as: $Y_t = \frac{1}{m} \sum_{j=-(\frac{m}{2})}^{(\frac{m}{2})-1} g_{t+j}$

crosses certain threshold of economic growth rate denoted as γ at time *t* from below or above. Accordingly, the dynamic cyclical provisioning rules, based on the state of the economy, are formulated as follows:

Based on State of the Economy

Rule 1: Cyclical provisioning is activated at time *t*, when A_t crosses the threshold γ from below i.e. ($A_t > \gamma$). The threshold value of γ is empirically estimated.

Rule 2: Cyclical provisioning is deactivated at time *t*, when A_t crosses the threshold γ from above i.e. ($A_t < \gamma$).

Based on the Inflection Point of Business Cycle

Even if the economy is operating in the zone of above-the-threshold γ, there could be episodes of deactivation and reactivation of the dynamic provisions, depending on the inflection point of the business cycle reflecting turnaround in the economic activity. If the economic activity decelerates by a given magnitude λ_1 at any given time point, even though the economy is above the threshold, there is a theoretical case of deactivation of dynamic provisions. Similarly, post-deactivation, there is a case for reactivation of dynamic provisions if the economic activity picks up by a magnitude λ_2 or if a pre-determined time period (denoted as *n* in this paper), equal to the average duration of peak to trough phase of the business cycle, lapses after deactivation, whichever occurs early. The rationale is, after deactivation, economic activity is expected to accelerate once it gets past the average duration of recession (peak to trough)[3].

The magnitude of deceleration or acceleration in the economic activities denoted by λ_1 and λ_2 respectively, required for identifying the inflection points are empirically determined based on year-on-year (y-on-y) variation in Y_t series, defined as $Y_t - Y_{t-k}$, where *k* is lag period of one year before (*k* = 4 for quarterly data). If the negative variation in Y_t i.e. $Y_t - Y_{t-k}$ at time t is lower than λ_1, the dynamic provisions are deactivated and the dynamic provision is reactivated if the positive variation in Y_t i.e. $Y_t - Y_{t-k}$ at time t is higher than λ_2.

Accordingly, the proposed model formulates the following rules for deactivation and reactivation based on the inflection points of the business cycle signifying turnaround in the economic activity as:

[3] The average duration of peak to trough of the business cycles is empirically estimated in Section V.

Rule 3: The cyclical provisioning is deactivated at time *t*, if $A_t > \gamma$ and $(Y_t - Y_{t-k}) \leq \lambda_1$ (i.e when A_t series at time *t* is above threshold γ and change in Y_t compared to one year ago is lower than λ_1, where λ_1 is the magnitude of deceleration in economic activity). The value of λ_1 is empirically estimated.

Rule 4: On application of Rule 3 at time *t*, the DP is reactivated at time *t* + *r*, if $A_{t+r} > \gamma$ and $(Y_{t+r} - Y_{t+r-k}) \geq \lambda_2$, where *r* = 1,2,3,…, *R* is the length of time period (i.e when A_t series is above threshold γ and change in Y_t series compared to one year ago is higher than λ_2, where λ_2 is the magnitude of acceleration in economic activity). The value of λ_2 is empirically estimated[4].

Rule 5: On application of Rule 3 at time *t*, the DP is reactivated from the time point (*t* + (*n*+1))th onwards if the deactivation by Rule 3 at time *t* continued upto the period *t* + *n* (where *n* is the incremental time period elapsed since time *t*). The time period of '*n*' is empirically estimated.

It needs to be noted that either Rule 4 or Rule 5 is applied on first-occurring basis as: if *n* < *r*, then Rule 5 is applied; otherwise Rule 4 is applied first given that $(Y_{t+r} - Y_{t+r-k}) \geq \lambda_2$. The rationale behind the application of Rule 4 and Rule 5 is that the pickup in economic activity warranting reactivation of dynamic provisioning is measured either by magnitude (λ_2) or by the average duration of the recession phase '*n*' signifying end of downturn.

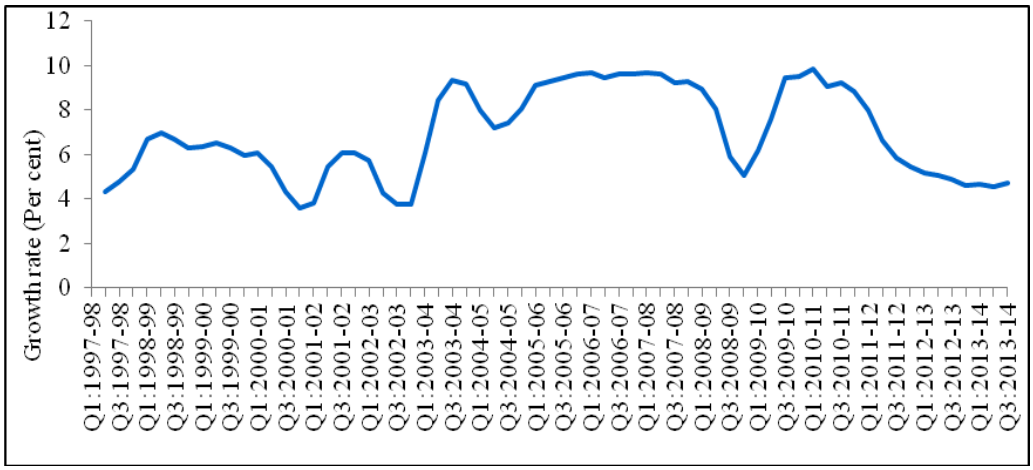
Reflecting the principle of conservatism, the model does not propose to suggest any automatic deactivation of dynamic provisions – unlike in the case of reactivation by Rule 5, which is based on the average duration of the phase from trough to peak signifying end of upturn. The iterative procedures involved in the conduct of the proposed model of Dynamic Provisions along with flow chart are presented in Annex-1:A. The next section estimates the theoretical parameters of the model.

[4] Let $Z_t = Y_t - Y_{t-4}$ be the y-o-y change in Y_t (centered moving average of real GDP growth rate (g_t) and Z_t^+ and Z_t^- denote corresponding positive and negative variation, respectively. Then the required magnitude of threshold λ_2 for reactivation of dynamic provisions can be calculated as $\lambda_2 = \sqrt{Var(Z_t^+)}$. Accordingly, the required magnitude of deceleration in the economic activity for deactivation of dynamic provisions is placed at $\lambda_1 = 2(\lambda_2)$

Section V: The Model Estimation[5]

To estimate the model, an endeavour is made to understand the characteristics of Indian business cycles. The data on quarterly real GDP (Base Year: 2004-05) covering the period Q1:2004-05 to Q3:2013-14 and quarterly real GDP (Base Year: 1999-2000) covering the period Q1:1996-97 to Q2:2009-10 were taken from the official website of Central Statistics Office (CSO), Government of India. Finally, the quarterly GDP data (Base Year: 2004-05) covering the period Q1: 1996-97 to Q3:2013-14 was obtained by splicing backward. The growth rate cycle is estimated as same-quarter-year-ago change in quarterly real GDP. As the estimated growth rate cycles are volatile, 3-quarter equally weighted centered moving average (Y_t) series is estimated to analyse the business cycle, eliminating the short-term lived volatility in the GDP growth rate[6]. Since the smoothing of the real GDP growth rate would not allow the estimates near the end points, which is required for analysing the recent data for timely policy action, the median forecast of real GDP growth rate (at factor cost) by professional forecasters for the period Q4:2013-14 to Q4:2014-15 were obtained from the quarterly Survey of Professional Forecasters (SPF)[7] conducted by Reserve Bank of India (RBI) for the quarter October-December 2013 (27th Round), published at RBI website. This would enable the estimates of the smooth series near the end points. The smooth growth rate cycles of real GDP since Q1:1997-98 is presented in Chart 2.

Chart 2: Growth Rate Cycle of Indian Economy



[5] In estimating the model's parameters, the techniques adopted are the simplest ones by conscious choice with a view to striking a balance between the need for technical sophistication and the imperative of relevance from practitioner's stand point.

[6] The length of the moving average has been determined from the spectral density estimated using Parzen window. The frequency corresponding to the period of less than one-year having maximum spectral is taken as the length of the moving average.

[7] The Reserve Bank has been conducting the Survey of Professional Forecasters every quarter since September 2007. The results of the survey were published in the Macroeconomic outlook of Macroeconomic and Monetary Developments (MMD) document of RBI.

The Characteristics of Indian Business Cycle: Duration and Amplitude of Phases

Central to the understanding of business cycles is to identify its set of turning points, which separate the phases of expansion and contraction. The literature provides what is called Bry and Boschan (1971) business cycle dating algorithm, modified by Harding and Pagan (2002). The Bry and Boschan procedure of dating business cycles for quarterly data is presented in the Annex-1:B. This algorithm detects local maxima (peak) and minima (trough) for a single quarterly series. Between a peak and trough of economic activity, an economy is in a contraction phase (a recession), while between a trough and peak of activity, an economy is in an expansionary phase (a boom). Once the turning points are identified, the characteristics of the business cycle, such as the duration and amplitude of the phases, can be derived, which in turn are used for analysing the dynamic provisioning rules as explained in section IV above. Based on Bry and Boschan algorithm, the identified peak and trough points of the Indian business cycle (Chart 2) since Q1: 1997-98 is presented in Table 1.

Table 1: Chronology of Indian Business Cycles

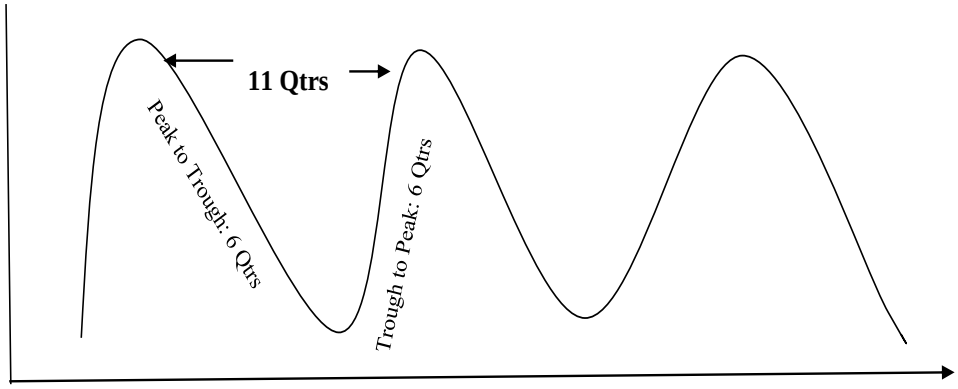
Date		Duration (in Number of Quarters)			
Peak Point	**Trough Point**	**Trough-Peak**	**Peak-Trough**	**Peak-Peak**	**Trough to Trough**
Q2:1998-99	Q4:2000-01	---	10	---	---
Q4:2001-02	Q4:2002-03	4	4	14	8
Q3:2003-04	Q2:2004-05	3	3	7	6
Q1:2007-08	Q4:2008-09	11	7	14	18
Q1:2010-11	---	5	---	12	---
Average Duration		6	6	12	11
Average Cycle period				11	

The chronology of the Indian business cycles reveals that the average duration of:

- ✓ peak to trough (recessionary period) is around 6 quarters
- ✓ trough to peak (expansionary period) is around 6 quarters
- ✓ the average duration of one business cycle (both peak to peak and trough to trough) is around 11 quarters

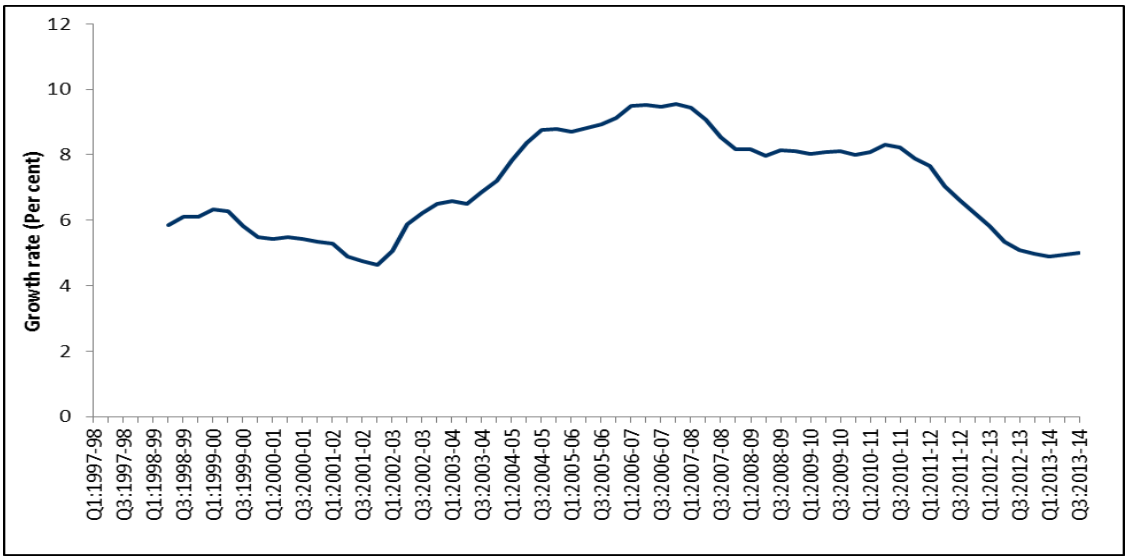
The above inference on the average duration and the phases of the cycles is illustrated in the following chart.

Chart 3: Chronology of Indian business cycle



Therefore, A_t series which represent the evolution of business cycles over time is obtained by smoothening of the real GDP growth rate over the cycle period, measured by a centered moving average of 11 quarters of real GDP growth rate (g_t) The last five end points of A_t series are estimated based on median forecast of real GDP growth rate by professional forecasters. The evolution of Indian business cycles over time is presented in Chart 4 and Annex-2.

Chart 4: Evolution of Indian Business Cycles:
11 Quarters Centered Moving Average Window

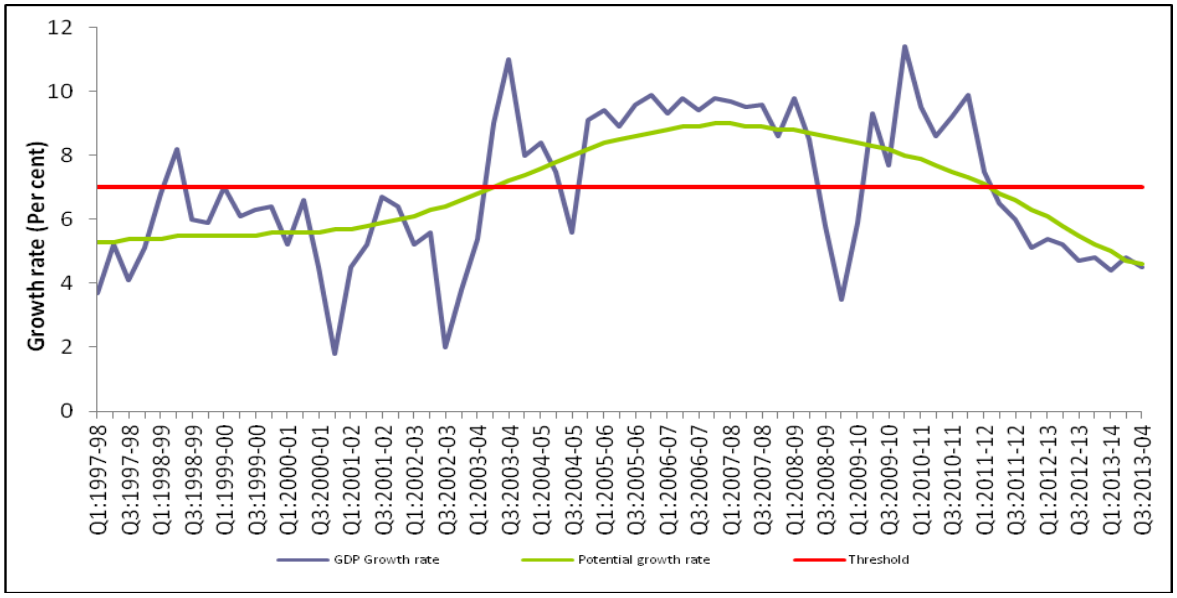


The Threshold γ

Estimation of potential growth rate is vast area of research interest. There are several methodological approaches to the estimation of potential output. Broadly speaking, there are two approaches: the univariate statistical approach and the structural approach. The univariate statistical approach derives estimates based purely on the behaviour of the output series itself by filtering out the trend component

from the cyclical component. The structural approach, in contrast, seeks to derive a measure of potential output from an estimated theoretical structure (Claudio Borio *et al*, 2013). For the limited purpose of this paper, the most popular univariate statistical approach namely the HP filter is adopted for estimating potential real output. Over the sample period under review, the potential growth rate ranged between 4.6 per cent and 8.9 per cent. The option of using potential growth as the threshold was explored. However, it was found less feasible for the reasons that it not only introduced great volatility in terms of frequently alternating state of the economy in the neighbourhood of the threshold but also identification of inflection points, once the economy was above the threshold, became difficult. In other words, while application of rule 1 and rule 2 created volatility in the conduct of dynamic provisions, application of rule 3 and rule 4/5 became impracticable. As an alternative, average of potential output growth rate is considered as the threshold[8] for the determination of trigger point based on state of the economy, which is estimated to be 7 per cent, as it fairly represented the dispersion of estimated potential growth over the same period. The Chart 5 below and Annex-2 present the estimated real output, potential output and the threshold.

Chart 5: Estimated Potential Growth Rate of Indian Economy: Threshold



As explained in Section IV above, the threshold (from Annex-2 and Chart 5) and the smooth real output series (from Annex-2 and Chart 4) are the main building blocks for the proposed business cycle-based model for dynamic provisioning in India.

[8] Ideally, the threshold should be estimated based on nonlinear structure of the potential growth rate. However, such an exercise is beyond the remit of the paper, given its limited objective.

Rules for Conducting Dynamic Provisioning

a) Based on state of economy: Business cycle

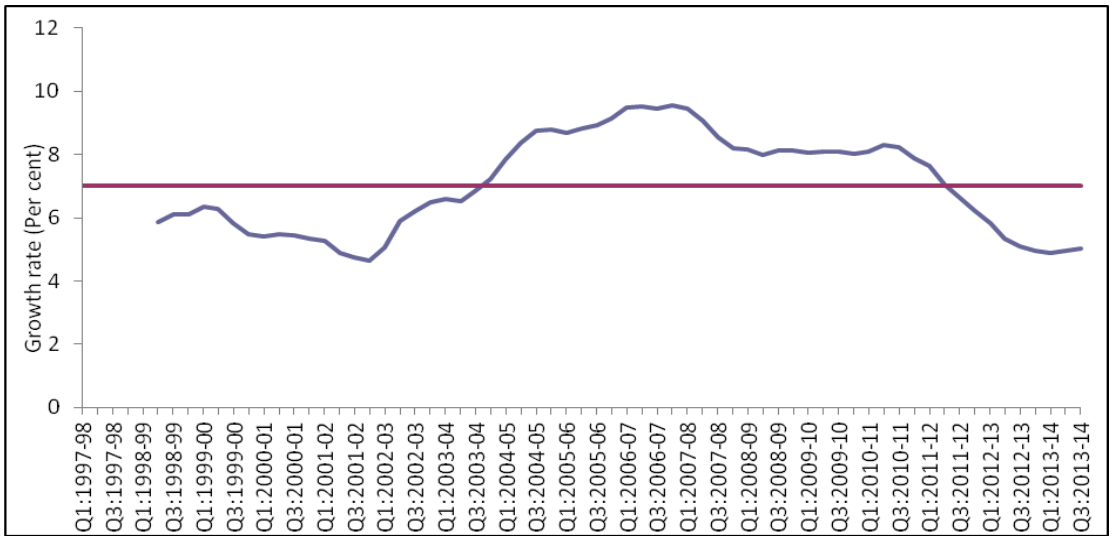
The economy is said to have entered boom phase of the business cycle if the real output (measured by the moving average of 11 quarter real GDP growth rate) crosses the threshold from below. Consequently, the DP is activated. On the other hand, the economy is said to have entered the recession phase if the real output crosses the threshold from above. Consequently, the DP is deactivated.

(a) Rule 1 for activation: If the moving average of y-o-y GDP growth rate of last 11 quarters goes from a level below 7% to the one above it (cross 7%from below), then dynamic provisioning is activated

(b) Rule 2 for deactivation: If the moving average of y-o-y GDP growth rate of last 11 quarters goes from a level above 7% to the one below it (cross 7% from above), then dynamic provisioning is deactivated.

The activation and deactivation of dynamic provisions based on state of the economy is illustrated in Chart 6.

Chart 6: Activation and Deactivation of DP by state of the Economy



b) Based on Inflection points of business cycles

As explained in the Section IV above, in addition the state of the economy as measured *vis-à-vis* the threshold (above or below), inflection points of the business cycles, even if the economy is operating above the threshold, signal appropriate regulatory action. If the economic activity decelerates by a given magnitude (denoted as λ_1 in the Model), even though the economy is above the threshold, there is a theoretical case of deactivation of dynamic provisions. Similarly, post-deactivation, there is a case for reactivation of dynamic provisions if the economic activity picks up

by a given magnitude (denoted as λ_2) or expected to pick up over a given period of time (denoted as *'n'*), even though the economy is above the threshold. In this paper, the magnitudes of change in economic activity denoted by λ_2 and λ_1 − warranting regulatory action (deactivation or reactivation as the case may be) are empirically estimated and are meant to signify the inflection points of the business cycle. Hence, determination of the inflection points does not have any theoretical underpinnings and looks more arbitrary and less objective. It is a limitation of the model[9]. For estimating the magnitudes of change in economic activity for identifying the inflection points, year-on-year (y-on-y) variation in 3-quarter (centered) moving average of real GDP growth rate is computed and is presented in Col 7 of Annex-2. Secondly, standard deviation for positive variation in y-o-y change of 3-quarter (centered) moving average of real GDP growth rate is calculated, which is placed at 1.7 percentage point. Accordingly, the required magnitude of acceleration in the economic activity for reactivation of dynamic provisions (denoted as λ_2 in the theoretical model above) is placed at 1.7 percentage points.

Following the Peruvian approach and as a principle of conservatism, the required magnitude of deceleration in the economic activity for deactivation of dynamic provisions (denoted as λ_1 in the theoretical model above), even though the economy is operating above threshold is placed at twice the negative value of λ_2 observed during the sample period (i.e. $\lambda_1 =$ (-) 3.4 percentage point).

What remains to be estimated now is the average duration of peak to trough phase, denoted as '*n*' in the model, which enables automatic reactivation of dynamic provisions following deactivation based on Rule 3. It is evident from the chronology of Indian business cycles (Table 1) above that the average duration of peak to trough phase is around 6 quarters. Therefore, *n* is set at 6 quarters. Meaning, post application of deactivation by Rule 3 at time *t*, dynamic provisions are automatically reactivated after 6 quarters since time *t*.

The rules for the conduct of dynamic provisions based on the inflection points are formulated as follows:

(a) Rule 3 for deactivation of activated provisioning: If the moving average of y-o-y GDP growth rate of last 11 quarters is already above 7% and the difference between the average of y-o-y GDP growth rate of the last 3 quarters and the same indicator one year before is lower by a magnitude of 3.4%, then the activated provisioning is deactivated.

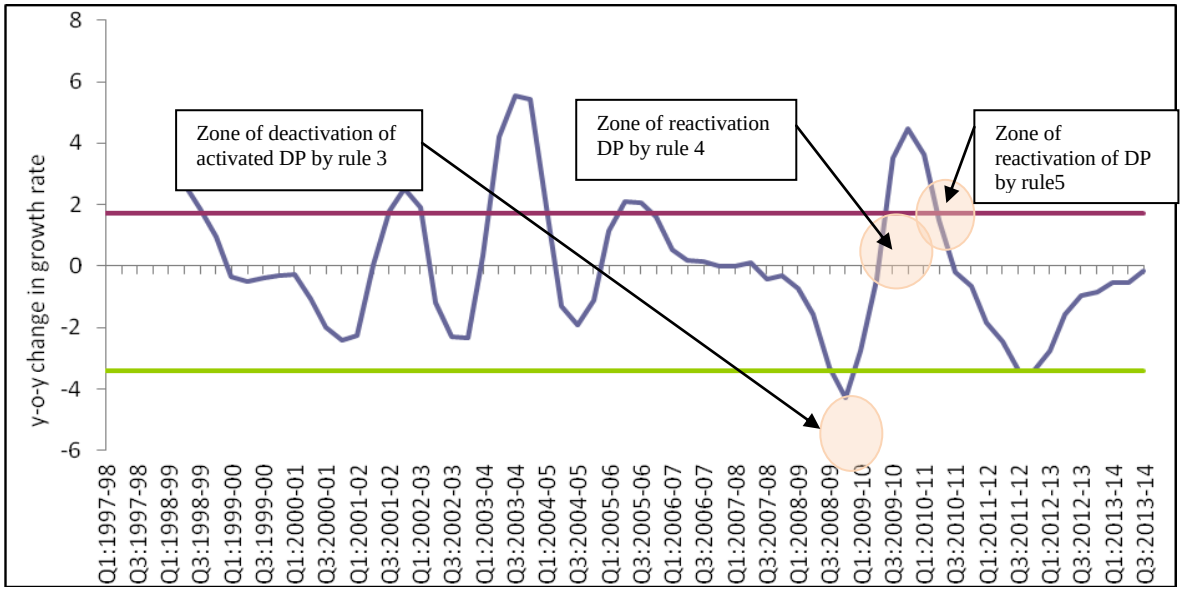
[9] However, we believe that this limitation is a matter of simplification assumed in the paper, given the main objective of developing an overall model. The technical nuances of robust and technical estimation are beyond the remit of the study.

(b) Rule 4 for reactivation by magnitude of acceleration: If the moving average of y-o-y GDP growth rate of last 11 quarters is already above 7% and the difference between the average of y-o-y GDP growth rate of the last 3 quarters and the same indicator one year before is higher by 1.7%, then deactivated DP by Rule 3 is reactivated.

(c) Rule 5 for reactivation by duration of downturn: If the moving average of y-o-y GDP growth rate of last 11 quarters is already above 7% and the DP was deactivated by Rule 3, then the DP is reactivated if a period of 6 quarters has passed since the time of said deactivation.

The rules of deactivation and reactivation of provisioning (Rules 3 to 5) when the provisioning is already in active mode (Rule 1) according to the state of the economy is illustrated in Chart 7.

Chart 7: Zone of Activation and Deactivation by Inflection Point



It needs to be noted that reflecting principle of conservatism, application of Rule 4 or Rule 5 is on 'either' 'or' basis, whichever occurs first. In other words, reactivation happen either on magnitude basis (1.7 percentage rise) by Rule 4 or on duration basis (6 quarters) by Rule 5, whichever is earlier. In Chart 7 above, Rule 4 occurred first.

Section VI: Model Back Testing

India has been among those few jurisdictions which have proactively undertaken countercyclical macro-prudential measures to prevent financial imbalances building up. Since December 2004, risk weights and provisioning on standard assets of select sensitive sectors viz., Commercial Real Estate (CRE),

Non-Banking Financial Companies (NBFCs), housing and retail were changed countercyclically to cushion the impact of the business cycles on banks in India. These time-varying regulatory requirements were based on the expert judgment about the credit growth in these sectors. If excessive credit growth was observed in these sectors, risk weights and provisions on the standard assets of these sectors were increased and these increases were scaled back once the credit growth slowed down.

In this section, an attempt is made to examine whether the signals emanating from the proposed model in this paper support timing of introduction of these countercyclical measures implemented over the years based on the expert judgment[10]. For the purpose of this exercise, increase in risk weight(RW)/ provisioning on standard assets of at least one of the identified sensitive sectors is taken as an indication of activation of dynamic provisioning. Similarly, decrease in risk weight/ provisions on standard assets of at least one of the identified sensitive sectors is taken as an indication of deactivation of dynamic provisioning.

The details of time-varying risk weight/provisioning requirements introduced by the Reserve Bank (RBI) based on expert judgment are presented in Annex 3. It is observed that the period from December 2004 to October 2008 witnessed increase in RWs/provisioning on standard assets of the identified sensitive sectors. The period between November 2008 and October 2009 saw such RW/Provisioning decreasing. Again from November 2009 onwards these requirements were hiked.

The signals of activation and deactivation of dynamic provisions thrown out by the model are identified in Annex-2. The timing of these signals are juxtaposed with the timings of the RBI measures (Annex-3). The summary of such comparison is presented in Table 2.

Table 2: Model-based signals for action vs Judgment based policy action

Type of action	**Model-based signals for action**	**Policy action based on judgment**
Activation	Jan-Mar (Q4) 2003-04 (by Rule 1)	Dec 2004
Deactivation	Jan-Mar (Q4) 2008-09 (by Rule 3)	Nov 2008
Activation	Oct-Dec (Q3) 2009-10 (by Rule 4)	Nov 2009
Deactivation	Oct-Dec (Q3) 2011-12 (by Rule 2)	Feb 2014[@]

@ DP reserves released.

[10] Model signals are based on the inter-temporal analysis of real output, premised on the fundamental principle that real output over-heating is followed by credit growth over-heating. On the on the hand, judgment-based policy actions were based on the inter-temporal analysis of credit growth in identified sensitive sectors. This difference needs to be kept in view. Further, it needs to be noted that the purpose of back-testing exercise in this paper is not to validate policy actions but to present the model in a broader perspective.

The following observations are apparent from the Table 2 above:

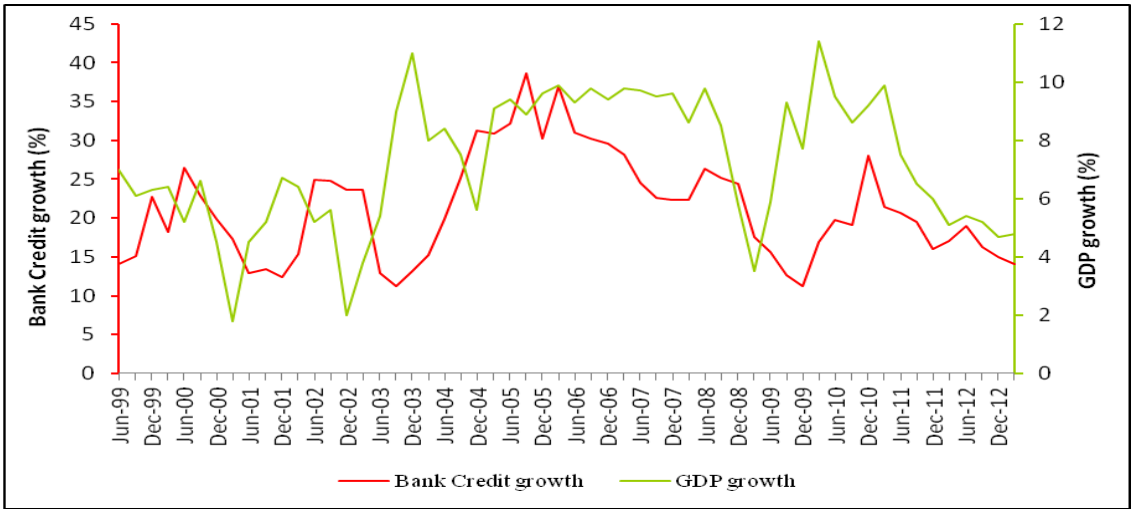
- The proposed model signaled for a phase of activation during Q4 (Jan – Mar) of 2003-04 based on high expansionary phase in the economic activity, whereas the actual policy action based on expert judgment was taken in December 2004: meaning the signals from the model predated actual policy action of activation by about 2 quarters.
- The Model signaled subsequent deactivation during Q4 (Jan – Mar) of 2008-09 based on inflection point, whereas the actual policy action for deactivation was taken in November 2008: Meaning the actual policy predated model signals by a quarter.
- The Model signaled subsequent reactivation during Q3 (Oct – Dec) of 2009-10 based on inflection point, whereas the actual policy action of reactivation was taken in November 2009: Meaning that the actual policy action was aligned with model's signals.
- Finally, the model calls for deactivation during Q3 (Oct – Dec) 2011-12 based on slowed down in the economic activity. The RBI released the buffer in February 2014.

The foregoing analysis underscores the fact that the proposed model by and large supports the judgment-based time-varying RW/Provisioning measures implemented by the RBI. The proposed model has several advantages.

It doesn't depend on banking data including credit growth and loss history. Availability and reliability of such a data with adequate time series is an issue for EMEs, including India. Secondly, as there is evidence that bank credit trails output[11] (Chart 8) and targeting output as such has greater element of inbuilt countercyclicality in terms of moderating/smoothening credit. Thirdly, from an EMEs perspective, higher credit growth *per se* does not necessarily indicate financial imbalances for variety of structural reasons. However, one of the drawbacks of the proposed model is that it applies on a system-wide basis and it can't be customized to institution-specific situation. Moreover, it penalizes a bank with prudent lending policy as it will be forced to provision above normal just because GDP is growing above a specified threshold.

[11] Based on cross spectral analysis involving data for 1997 to 2013, there is evidence that aggregate bank credit trails output in the business cycle frequency band. The results are not reported in the paper, as technicalities thereof are not the remit of it.

Chart 8: Bank Credit and GDP growth



Thus, while the proposed model could potentially be looked at as an independent and standalone methodology for the conduct of dynamic provisions in India based on the business cycles, from the perspective of immediate policy relevance, the proposed model could provide the framework that RBI Discussion Paper on dynamic provisioning calls for to enable determination of timing of drawing down the accumulated DP reserves. In particular, the RBI discussion paper on dynamic provisioning, while proposing an approach for the conduct of dynamic provisioning in India, sounds a note of caution regarding drawing down of the DP fund. To quote relevant extracts from the RBI discussion paper, *…"In order to ensure that banks do not draw down from dynamic provisions to absorb higher losses due to their own credit appraisal and credit supervision weaknesses and deplete it before the slowdown occurs, its draw down is proposed to be allowed specifically by RBI based on evidence of a slowdown. A suitable framework for release of dynamic provisions could be formulated by RBI"* (page 16). The model presented in this paper has two rules – Rule 2 and Rule 3 – for deactivation. Rule 3 applies when the economy is operating above the threshold and Rule 2 kicks in if the economy goes below the threshold. From the perspective of determining timing of release of DP reserves, Rule 2 could be of policy relevance.

Drawing from the Internal Rating Based -Advanced (IRB-A) approach of Basel II to credit risk, for the conduct of dynamic provisioning, the RBI Discussion Paper defines Expected Loss as DP*LGD*ED, recommends downturn Loss Given Default (LGD) and explains how the downturn LGD is computed. To quote the relevant extract in this regard *"Downturn LGD is arrived at by multiplying the average LGD with a scaling factor of 1.58"* (page 19).

This paper provides a more systematic and macroeconomic approach to identify the downturn through the analysis of business cycle. Based on the data for

77 quarters involving 7 cycles (consisting of 4 peak-to-peak and 3 trough to trough cycles), the paper identifies the period Q2:1998-99 to Q4:2001-02 as the long downturn period with Q4:2001-02 as trough point , signifying the largest negative deviation of the smoothened-over-the-cycle output from the estimated threshold. The LGDs recorded in this period could be the possible LGDs for the computation of Expected Loss.

Therefore, the findings of the paper have two-fold policy relevance for the conduct of dynamic provisioning as formulated in the RBI Discussion Paper on the subject: methodology for determining timing for the release of the DP Reserves (Rule 2) and for identifying downturn for the estimation of downturn LGDs needed for arriving at the Expected Loss.

Section VII: Concluding Remarks

Conduct of dynamic provisions presupposes knowledge of the characteristics of the business cycles including the average duration of a cycle and the phases of the cycle. In this context, understanding the turning points of the business cycles is critical. In this paper, an attempt is made to develop a framework of dynamic provisioning for India based on business cycles of quarterly real GDP data since 1996-97. Using Bry and Boschan algorithm involving identification of local maxima and local minima, the paper finds evidence that the average duration of business cycle in India is 11 quarters consisting of an average 6-quarter up phase and average 6-quarter down phase.

Based on detailed analysis of Indian business cycles, the paper proposes a model capable of identifying various phases of growth of real output, warranting activation/deactivation of dynamic provisions. For this purpose, a threshold based on average potential output growth rate is determined. Employing the simplest and the most popular method for estimation of potential output, the paper empirically estimates such potential output threshold at 7 per cent.

For the conduct of dynamic provisions in India based on the study of business cycles, the paper formulates five rules. Further, in back testing the model, the paper finds evidence that the model-based signals for the activation/deactivation of dynamic provisions by and large supported the timing of judgment-based increase or decrease in RW/provisions on the standard assets of certain identified sensitive sectors introduced by the RBI since December 2004.

The proposed model has many merits and demerits. While it could potentially be looked at as a complete and standalone model for the conduct of dynamic

provisions in India, the immediate policy relevance of it lies in the fact that the model has a built-in framework for determining timing of the drawdown of the DP reserves. While formulating a banking data-centric model for the conduct of dynamic provisions, the RBI discussion paper on the subject calls for a methodology to assist in ensuring that draw down of DP reserves is basically in response to a system-wide growth slowdown and not to camouflage an idiosyncratic leading practices of individual banks. In this context, Rule 2 of the proposed model is of particular policy relevance as it identifies such phases in real economic activity. Further, the model through the analysis of business cycles enables determining the downturn, required for estimating the LGD, which is a crucial input for the application of DP framework proposed in the RBI Discussion Paper. The model, however, do not provide guidance for differentiated approach across the banks

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Annex-1

A. Iteration of Steps in Implementing the Model

The model is implemented in practice according to the following steps:

Step 1: Dynamic provisioning (DP) is activated/deactivated based on the position of the series A_t vis-à-vis the threshold γ (defined in the model) at time *t* as follows:

(i) DP activated: if A_t crosses the threshold γ from below ($A_t > \gamma$).

(ii) DP deactivated: if A_t crosses the threshold γ from above ($A_t < \gamma$).

Step 2: Suppose, DP is activated by *Step 1* (i). Then it continues to be in activation mode, unless it is deactivated by *Step 3*.

Step 3: DP is deactivated which is in activation in *Step 2*, if $A_t > \gamma$ and $(Y_t - Y_{t-k}) \leq \lambda_1$ (i.e when A_t series is above threshold γ and change in Y_t series as compared to one year ago is lower than λ_1.

Step 4: Once it is deactivated in *Step 3*, it continue to be in that state, unless it is reactivated at time *t* + *r*, according to either of the following conditions (whichever condition is satisfied first):

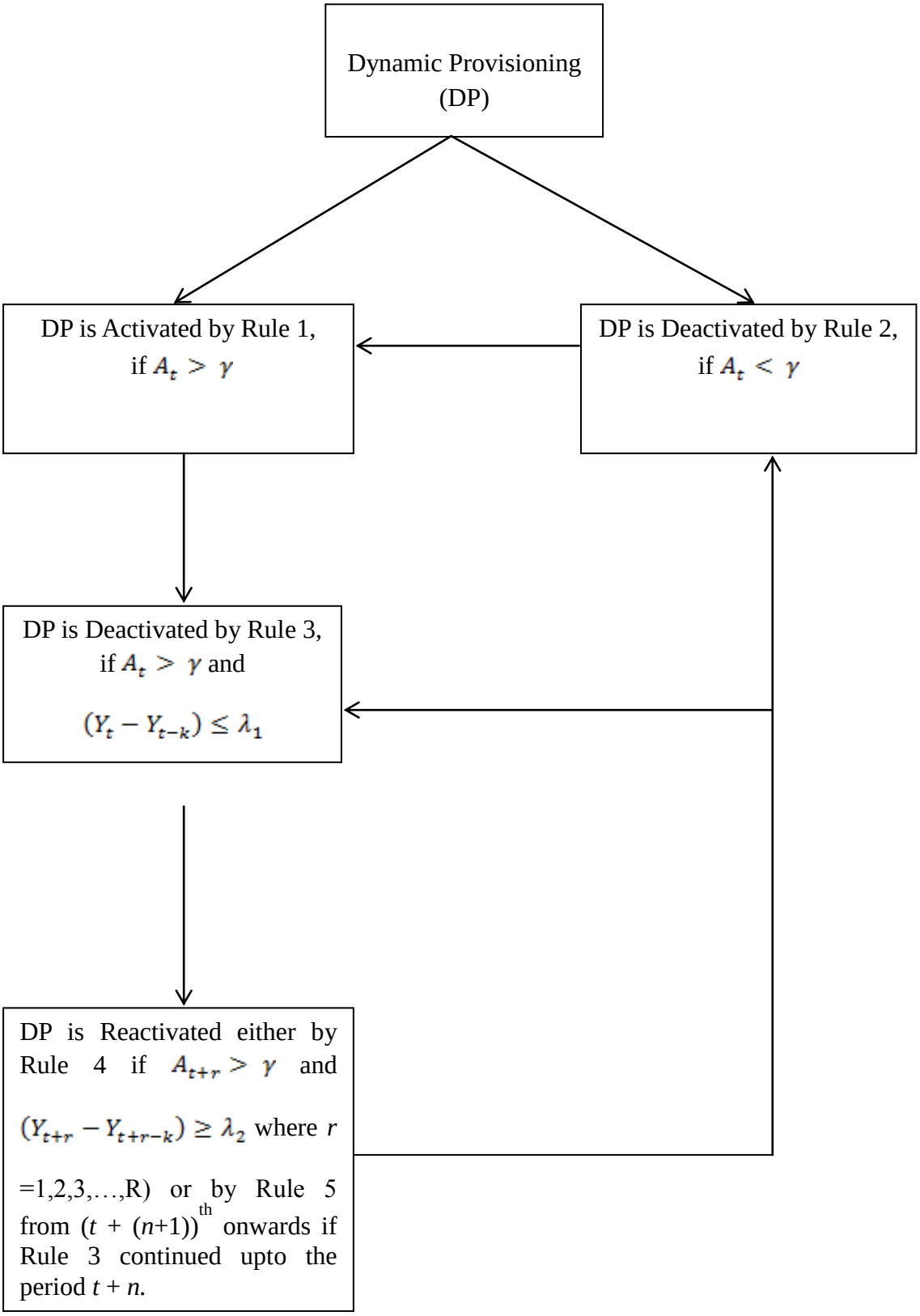
(i) Reactivated, if $A_{t+r} > \gamma$ and $(Y_{t+r} - Y_{t+r-k}) \geq \lambda_2$, where *r* = 1,2,3,…, *R* is the length of time period (i.e when A_t series is above threshold γ and change in Y_t series compared to one year ago is greater than λ_2.

(ii) Reactivated from the time point (*t* + (*n*+1))th onwards if the deactivation by Rule 3 at time *t* continued upto the period *t* + *n* (where *n* is the incremental time period elapsed since time *t, but less than the length of the time period 'r'* indicated in Step 4 *(i))*.

Step 3 and *Step 4* iterate alternately as long as at any given point in time *t*, A_t series is above threshold γ (in Step 2). On the other hand, if A_t series crosses threshold γ from above, *Step 1 (ii)* commences and *Step 1 (ii)* remains in place as long as A_t series is below the threshold γ and is activated again only by *Step 1 (i)*. Subsequently, *Step 3* and *Step 4* are iterated again.

The iteration of the steps underlying the conduct of the DP model is summarized in the following flow chart (Diagram 1)

Diagram 1: Steps of Iteration in the Conduct of Dynamic Provisioning



B: Bry and Boschan procedure of dating business cycles for the quarterly data

(i) A peak (trough) must be followed by a trough (peak).

(ii) A cycle (from peak to peak or from trough to trough) must have a duration of at least 5 quarters.

(iii) A phase (from peak to trough or from trough to peak) must have a duration of at least 2 quarters.

(iv) Turning points are not to be situated within the first or last 2 quarters of a time series.

(v) The first (last) peak and trough must be higher and lower, respectively, than values closer to the beginning (end) of the data series.

Annex-2: Estimation and Back Testing of the Proposed Model

Quarter	GDP Growth rate (g_t)	Potential growth rate	Threshold (γ)	Smooth-over-the cycle GDP growth rate (A_t)	Smooth-3-quarter moving average GDP growth rate (Y_t)	y-on-y change in Y_t ($Y_t - Y_{t-4}$)	Deviation of A_t from threshold γ ($A_t - \gamma$)	Phase of dynamic provisions by Model	Phase of dynamic provisions by Policy based on judgment
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) = (5) -(4)	(9)	(10)
Q1:1997-98	3.7	5.3	7.0						
Q2:1997-98	5.2	5.3	7.0		4.3				
Q3:1997-98	4.1	5.4	7.0		4.8				
Q4:1997-98	5.1	5.4	7.0		5.3				
Q1:1998-99	6.8	5.4	7.0		6.7				
Q2:1998-99	8.2	5.5	7.0	5.9	7.0	2.6	-1.1	Rule 2	
Q3:1998-99	6	5.5	7.0	6.1	6.7	1.9	-0.9	Rule 2	
Q4:1998-99	5.9	5.5	7.0	6.1	6.3	1.0	-0.9	Rule 2	
Q1:1999-00	7	5.5	7.0	6.3	6.4	-0.3	-0.7	Rule 2	
Q2:1999-00	6.1	5.5	7.0	6.3	6.5	-0.5	-0.7	Rule 2	
Q3:1999-00	6.3	5.5	7.0	5.8	6.3	-0.4	-1.2	Rule 2	
Q4:1999-00	6.4	5.6	7.0	5.5	6.0	-0.3	-1.5	Rule 2	
Q1:2000-01	5.2	5.6	7.0	5.4	6.1	-0.3	-1.6	Rule 2	
Q2:2000-01	6.6	5.6	7.0	5.5	5.4	-1.1	-1.5	Rule 2	
Q3:2000-01	4.5	5.6	7.0	5.4	4.3	-2.0	-1.6	Rule 2	
Q4:2000-01	1.8	5.7	7.0	5.3	3.6	-2.4	-1.6	Rule 2	
Q1:2001-02	4.5	5.7	7.0	5.3	3.8	-2.3	-1.7	Rule 2	
Q2:2001-02	5.2	5.8	7.0	4.9	5.5	0.0	-2.1	Rule 2	
Q3:2001-02	6.7	5.9	7.0	4.8	6.1	1.8	-2.2	Rule 2	
Q4:2001-02	6.4	6.0	7.0	4.6	6.1	2.5	-2.4	Rule 2	
Q1:2002-03	5.2	6.1	7.0	5.1	5.7	1.9	-1.9	Rule 2	
Q2:2002-03	5.6	6.3	7.0	5.9	4.3	-1.2	-1.1	Rule 2	

Quarter	GDP Growth rate (g_t)	Potential growth rate	Threshold (γ)	Smooth-over-the cycle GDP growth rate (A_t)	Smooth-3-quarter moving average GDP growth rate (Y_t)	y-on-y change in Y_t ($Y_t - Y_{t-4}$)	Deviation of A_t from threshold γ ($A_t - \gamma$)	Phase of dynamic provisions by Model	Phase of dynamic provisions by Policy based on judgment
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) = (5) -(4)	(9)	(10)
Q3:2002-03	2	6.4	7.0	6.2	3.8	-2.3	-0.8	Rule 2	
Q4:2002-03	3.8	6.6	7.0	6.5	3.8	-2.4	-0.5	Rule 2	
Q1:2003-04	5.4	6.8	7.0	6.6	6.1	0.3	-0.4	Rule 2	
Q2:2003-04	9	7.0	7.0	6.5	8.5	4.2	-0.5	Rule 2	
Q3:2003-04	11	7.2	7.0	6.9	9.3	5.5	-0.1	Rule 2	
Q4:2003-04	8	7.4	7.0	7.2	9.2	5.4	0.2	Rule 1	
Q1:2004-05	8.4	7.6	7.0	7.8	8.0	1.9	0.8	Rule 1	
Q2:2004-05	7.5	7.8	7.0	8.4	7.2	-1.3	1.4	Rule 1	
Q3:2004-05	5.6	8.0	7.0	8.8	7.4	-1.9	1.8	Rule 1	
Q4:2004-05	9.1	8.2	7.0	8.8	8.0	-1.1	1.8	Rule 1	Activation
Q1:2005-06	9.4	8.4	7.0	8.7	9.1	1.1	1.7	Rule 1	Activation
Q2:2005-06	8.9	8.5	7.0	8.8	9.3	2.1	1.8	Rule 1	Activation
Q3:2005-06	9.6	8.6	7.0	8.9	9.5	2.1	1.9	Rule 1	Activation
Q4:2005-06	9.9	8.7	7.0	9.1	9.6	1.6	2.1	Rule 1	Activation
Q1:2006-07	9.3	8.8	7.0	9.5	9.7	0.5	2.5	Rule 1	Activation
Q2:2006-07	9.8	8.9	7.0	9.5	9.5	0.2	2.5	Rule 1	Activation
Q3:2006-07	9.4	8.9	7.0	9.5	9.7	0.2	2.5	Rule 1	Activation
Q4:2006-07	9.8	9.0	7.0	9.5	9.6	0.0	2.5	Rule 1	Activation
Q1:2007-08	9.7	9.0	7.0	9.4	9.7	0.0	2.4	Rule 1	Activation
Q2:2007-08	9.5	8.9	7.0	9.1	9.6	0.1	2.1	Rule 1	Activation
Q3:2007-08	9.6	8.9	7.0	8.5	9.2	-0.4	1.5	Rule 1	Activation
Q4:2007-08	8.6	8.8	7.0	8.2	9.3	-0.3	1.2	Rule 1	Activation
Q1:2008-09	9.8	8.8	7.0	8.2	9.0	-0.7	1.2	Rule 1	Activation
Q2:2008-09	8.5	8.7	7.0	8.0	8.0	-1.6	1.0	Rule 1	Activation

Quarter	GDP Growth rate (g_t)	Potential growth rate	Threshold (γ)	Smooth-over-the cycle GDP growth rate (A_t)	Smooth-3-quarter moving average GDP growth rate (Y_t)	y-on-y change in Y_t ($Y_t - Y_{t-4}$)	Deviation of A_t from threshold γ ($A_t - \gamma$)	Phase of dynamic provisions by Model	Phase of dynamic provisions by Policy based on judgment
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) = (5) -(4)	(9)	(10)
Q3:2008-09	5.8	8.6	7.0	8.1	5.9	-3.3	1.1	Rule 1	Activation
Q4:2008-09	3.5	8.5	7.0	8.1	5.0	-4.3	1.1	Rule 3	Activ/Deaa
Q1:2009-10	5.9	8.4	7.0	8.1	6.2	-2.8	1.0	Rule 3	Deactivated
Q2:2009-10	9.3	8.3	7.0	8.1	7.6	-0.4	1.1	Rule 3	Deactivated
Q3:2009-10	7.7	8.2	7.0	8.1	9.4	3.5	1.1	Rule 4	Deactivation
Q4:2009-10	11.4	8.0	7.0	8.0	9.5	4.5	1.0	Rule 4	Deactivated
Q1:2010-11	9.5	7.9	7.0	8.1	9.8	3.6	1.1	Rule 4	Activation
Q2:2010-11	8.6	7.7	7.0	8.3	9.1	1.5	1.3	Rule 4	Activation
Q3:2010-11	9.2	7.5	7.0	8.2	9.2	-0.2	1.2	Rule 4	Activation
Q4:2010-11	9.9	7.3	7.0	7.9	8.9	-0.6	0.9	Rule 4	Activation
Q1:2011-12	7.5	7.1	7.0	7.7	8.0	-1.9	0.7	Rule 4	Activation
Q2:2011-12	6.5	6.8	7.0	7.1	6.7	-2.4	0.0	Rule 4	Activation
Q3:2011-12	6	6.6	7.0	6.6	5.8	-3.4	-0.4	Rule 2	Activation
Q4:2011-12	5.1	6.3	7.0	6.2	5.5	-3.4	-0.8	Rule 2	Activation
Q1:2012-13	5.4	6.1	7.0	5.8	5.2	-2.8	-1.2	Rule 2	Activation
Q2:2012-13	5.2	5.8	7.0	5.3	5.1	-1.6	-1.7	Rule 2	Activation
Q3:2012-13	4.7	5.5	7.0	5.1	4.9	-1.0	-1.9	Rule 2	Activation
Q4:2012-13	4.8	5.2	7.0	5.0	4.6	-0.9	-2.0	Rule 2	Activation
Q1:2013-14	4.4	5.0	7.0	4.9	4.7	-0.6	-2.1	Rule 2	Activation
Q2:2013-14	4.8	4.7	7.0	5	4.6	-0.5	-2.0	Rule 2	Activation
Q3:2013-14	4.5	4.6	7.0	5	4.7	-0.2	-2.0	Rule 2	Activation
Average of estimated potential growth rate ≈ 7			**Standard Deviation of +ve variation in $Y_t - Y_{t-4}$ in Col (7) ≈ 1.7**						

Note: 1. In Col 6, a 3-quarter centered moving average of g_t (Col (2)) is presented.

2. In Col 5, a 11-quarter centered moving average of g_t (Col (2)) is presented

3. The last end point of smooth-3-quarter moving average (Y_t) and last 5 end points of smooth-over-the cycle (A_t) of GDP growth rate were estimated based on median forecast of real GDP growth rate by professional forecasters (SPF).

Median real GDP (at factor cost) growth rate from SPF-27 Round:

Quarter	**Q4:2013-14**	**Q1:2014-15**	**Q2:2014-15**	**Q3:2014-15**	**Q4:2014-15**
GDP growth rate	4.9	5.0	5.3	5.7	5.9

Annex-3

Time-varying Risk Weight/Provisioning Requirements introduced by RBI

Macro-prudential policies	Date of introduction (Col 8 of Annex-2)	Purpose(s)
Banks to make a general provision on standard assets of a minimum of 0.25 percent from the year ending March 31, 2000.	March 31, 2000	For enhancing the inherent strength of banks' balance sheets.
Housing loans to individuals against the mortgage of residential housing properties can be assigned risk weight of 50 per cent.	May 24, 2002	For improving the flow of credit to the housing sector.
Risk weights on housing loans extended by banks to individuals, fully secured by mortgage of residential properties increased to 75 per cent. Risk weight on consumer credit, including personal loans and credit cards receivables from 100 per cent to 125 per cent.	December 23, 2004	Introduced as a temporary counter cyclical measure, when it was observed that the growth of housing and consumer credit was very strong.
Risk weight on banks' exposure to the commercial real estate and risk weight for credit risk on capital market exposures increased from 100 per cent to 125 per cent.	July 26, 2005	To address the higher risk involved.
General provisioning requirement for 'standard advances' increased from 0.25 per cent to 0.40 per cent, with the exception of banks' direct advances to agricultural and SME sectors.	November 4, 2005	To build up provisioning to cushion banks' balance sheets in the event of a downturn in the economy or credit weaknesses surfacing later.
Risk weight on banks' exposure to the commercial real estate increased to 150 per cent	May 25, 2006	To address the higher risk involved.
General provisioning requirement on standard advances in specific sectors, i.e., personal loans, loans and advances qualifying as capital market exposures, residential housing loans beyond Rs.20 lakh and commercial real estate loans increased from 0.40 per cent to 1.0 per cent.	May 29, 2006	To ensure that asset quality is maintained in the light of high credit growth.
Increase in the provisioning requirement in respect of the standard assets in the	January 31, 2007	Concerns due to continued high credit growth in the real estate

following categories of loans and advances from the present level of one per cent to two per cent with immediate effect: a) Personal loans (including credit card receivables); b) Loans and advances qualifying as capital market exposure; and c) Real estate loans (excluding residential housing loans). Increase in provisioning requirement for loans and advances in the standard assets category to Non-Deposit Taking Systemically Important Non-Banking Finance Companies (NBFC-ND-SI) from 0.40 per cent to two per cent.		sector, personal loans, credit card receivables, and loans and advances qualifying as capital market exposure and a higher default rate in regard to personal loans and credit card receivables.
Risk weight in respect of housing loans up to Rs. 20 lakh to individuals against the mortgage of residential housing properties reduced from 75% to 50%.	May 3, 2007	Considering the lower risk in smaller housing loans and the fact that banks had tightened their credit administration in this area in particular.
Risk weights on residential housing loans with LTV ratio up to 75 per cent are 50 per cent for loans up to Rs. 30 lakh and 75 per cent for loans above that amount. In case the LTV ratio is more than 75 per cent, the risk weight of all housing loans, irrespective of the amount of loan, is 100 per cent.	May 14, 2008	To address the differences in risks involved.
The provisioning requirements for all types of standard assets stand reduced to a uniform level of 0.40 per cent except in the case of direct advances to agricultural and SME sectors, which shall continue to attract a provisioning of 0.25 per cent, as hitherto. The risk weights for the banks' claims secured by commercial real estate reduced to 100 per cent as against the extant risk weight of 150 per cent.	November 15, 2008	As a countercyclical measure
Increase in the provisioning requirement for advances to the CRE sector classified as 'standard assets' from the present level of 0.40 per cent to 1.00 per cent.	November 5, 2009	In view of large increase in credit to the Commercial Real Estate (CRE) sector over the last one year and the extent of restructured advances in this sector, it was considered prudent to build cushion against

		likely non-performing assets (NPAs).
LTV ratio in respect of housing loans should not exceed 80 per cent. However, for small value housing loans, i.e. housing loans up to Rs. 20 lakh (which get categorised as priority sector advances), LTV ratio should not exceed 90 per cent. Risk weight for residential housing loans of Rs. 75 lakh and above, irrespective of the LTV ratio, increased to 125 per cent. Standard asset provisioning in respect of housing loans sanctioned at teaser rates increased from 0.40 per cent to 2.00 per cent with immediate effect. The provisioning on these assets would revert to 0.40 per cent after 1 year from the date on which the rates are reset at higher rates if the accounts remain 'standard'.	December 23, 2010	In order to prevent excessive leveraging To prevent excessive speculation in the high value housing segment. Higher risk associated with such loans - some borrowers may find it difficult to service the loans once the normal interest rate, which is higher than the rate applicable in the initial years, becomes effective; many banks at the time of initial loan appraisal, do not take into account the repaying capacity of the borrower at normal lending rates.
CRE- (Residential Housing) RH segment will attract a lower risk weight of 75% and lower standard asset provisioning of 0.75% as against 100% and 1.00%, respectively for the CRE segment. Individual housing loans, irrespective of the amount of loan attract standard asset provision of 0.40%. Housing loans upto Rs.75 lakh attract risk weights of 50% and loans above Rs.75 lakh carry risk weights of 75%. LTV ratio for housing loans upto Rs.20 lakh cannot exceed 90%, for loans above Rs.20 lakh and upto Rs.75 lakh cannot exceed 80% and for loans above Rs.75 lakh cannot exceed 75%.	June 21, 2013	As loans to the residential housing projects under the Commercial Real Estate (CRE) Sector exhibit lesser risk and volatility than the CRE Sector taken as a whole, it was decided to carve out a separate sub-sector called Commercial Real Estate - Residential Housing (CRE-RH) from the CRE Sector. CRE-RH would consist of loans to builders / developers for residential housing projects (except for captive consumption) under CRE segment. Such projects should ordinarily not include non-residential commercial real estate. To rationalise the prudential norms on risk-weight, provisioning and LTV ratio for individual housing loans, CRE and CRE-RH exposures.

Source: RBI

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