“Mitigating the procyclicality of capital requirements: an empirical assessment of CEBS’s proposals”

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Mitigating the procyclicality of capital requirements: an empirical assessment of CEBS's proposals

Abstract

In the recent debate about the measures that could be implemented in order to mitigate the procyclicality of capital requirements in the Basel II framework, the Committee of European Banking Supervisors (CEBS) made an original proposition that relies on the building-up of capital buffers beyond the regulatory minimum that would be accumulated in 'good times' and depleted in 'bad times'. This paper seeks to evaluate this proposal and provides an empirical assessment based on US data over the period of 1991-2008. It shows that the buffer computed according to this proposal would have the desired properties and that the variant based on both the probabilities of default (PDs) and the transition matrices penalizes adequatly more 'Point-in-Time' ratings philosophies.

Keywords: financial stability, countercyclical capital buffer, procyclicality.
JEL Classification: E44, E61, G21.

Introduction

According to some observers, the current Basel II framework might prove procyclical. In addition, the current economic and financial crisis has shed light on the risk aversion against the cost of that potential procyclicality.

Before and since its inception, the Basel II framework gained the attention of many observers in that its implementation would foster the cyclicality of the regulatory framework (Borio et al., 2001; Danielson et al., 2001; Clerc et al., 2001; Dietsch and Garabiol, 2004). By essence, the primary aim of the Basel II Accord is to create a close link between capital requirements and risks, which are substantially dependent on the business cycle mainly for risk assessments that rely on internal ratings (Catarineu-Rabell et al., 2005). It results in that banks would hold less capital or over-lend at upturns, when the systemic risk is high, while they would hold too much capital or under-lend during downturns when the macroeconomic stabilization requires an expansion of lending. The subsequent credit squeeze would add to the downturn and further destabilize the economy by exaggerating fluctuations. This is one of the mechanisms of procyclicality. There is, also, some preliminary empirical evidence suggesting that minimum capital requirements would be more procyclical under the Basel II framework that under the former standards (Borio and Howels, 2004). Some argue that fluctuations of the order of 30% in the course of a normal business cycle may be possible. As indicated by Segoviano and Lowe (2002), these could be greater in case of larger business cycle fluctuations accompanied by financial distress. Borio (2003) argues that, by design, risk-based capital regulation has a pro-cyclical trend.

In the course of the current crisis, a strand of proposals aims at mitigating those potential procyclical effects. In particular, the Committee of European Banking Supervisors (CEBS) published on 17th July, 2009 a position paper describing a "possible countercyclical capital buffer". The CEBS's paper puts forward the building-up of a supplementary amount of capital beyond the regulatory minimum capital requirement that would grow and be accumulated in expansionary periods and decrease in downturns. It would provide banks with additional capital in recessionary periods, allowing them not to dramatically restrict credit distribution and thus, sustaining economic activity. The proposals embedded in the CEBS's paper seek to limit in particular the (pro-) cyclicality of the credit risk related to corporate counterparties in the banking book, and are circumscribed to banks adopting the Internal Ratings Based (IRB) system. The first approach is based on a portfolio design, whereas the second one mixes a grade-level approach with ratings migrations. This paper seeks to evaluate these proposals.

Our results show that whatever the methodology used, the buffers in the PiT portfolio are higher and more volatile than in the TTC portfolio. In that respect, the two-step grade-level approach induces higher buffers than the portfolio-level approach for a PiT portfolio, as expected. This could be understood as a significant advantage, so that banks have strong incentives to adopt more TTC ratings philosophies. In a TTC portfolio, both buffers appear of the same magnitude.

The remainder of the paper is organized as follows: Section 1 describes in more details the two approaches embedded in the proposal. Section 2 provides an empirical assessment of this proposition and the final Section concludes.

1. Description of the approaches

1.1. Downturn PDs computed at the portfolio level. The mechanism takes into account the historical changes in the probabilities of default (PDs) of banks' portfolios – the key driver of minimum capi-

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tal requirements under the IRB approach along with ratings migrations – in order to build specific buffers against recessionary conditions. In practice, the capital buffer is computed as the difference between the amount of capital required using the current PDs and that using downturn PDs (i.e., corresponding to a maximum of PDs). This buffer is to increase in expansions and decrease in recessions.

The portfolio approach can be described as follows on a step-by-step basis:

First, a portfolio's probability of default PD_t^p at time t (in practice, every year) is computed as the average of grade PDs weighted by the number of counterparties in each grade.

$$PD_t^p = \sum_{g=1}^{k} PD_t^g N_t^g \Big/ \sum_{g=1}^{k} N_t^g \quad ,$$

where PD_t^g is the PD of each grade *"g"*, $g = 1,\ldots, k$, and $N^g{}_t$ is the number of counterparties in each grade *"g"*.

Second, grade PDs at time t are multiplied by the corrective ratio $PD^p_{downturn} \big/ PD_t^p$, where $PD^p{}_{downturn}$ is the maximum of PD_t^p over the sample. This ratio is expected to be close to 1 in a downturn and higher than 1 in an expansionary period.

Finally, the capital buffer is computed as the difference between the amounts of minimum required capital estimated using the adjusted grade PDs and the original grade PDs.

1.2. Downturn PDs at the grade level with ratings migrations. It is worth mentioning, however, that the portfolio-level approach encompasses a couple of technical limits:

- By construction, the same corrective ratio is applied to all credit grades, while the same effect is not expected on "good" credit grades, i.e., whose initial PDs are low, as on "bad" credit grades, i.e., whose initial PDs are high.
- It assumes an invariant portfolio composition over time.

As a result, a more granular grade level approach might display significant advantages. Nevertheless, a raw replication of the portfolio-level at the grade-level could be misleading. For instance, in case the PDs used are *Through-the-Cycle*[1] (TTC), grade-level PDs at the time t and downturn grade-level PDs could be close each other if ratings migrations are not taken into account.

A grade-level approach (where downturn PDs and scaling factors are grade-specific), which also takes explicitly into account ratings migrations, in a two-step approach, could overcome these problems. In particular, before calculating downturn PDs for each grade (i.e., the highest historical PDs) one could introduce, in a first step, ratings migrations. The proposal here is to compute a grade-level modified PD, "mod PD", which considers ratings migrations as follows:

$$\mathrm{mod}\, PD_t^g = (1-\alpha-\beta)PD_t^g + \alpha PD_t^{g+1} + \beta PD_t^{g-1},$$

where α is the share of counterparts rated *"g"* at the date t-1 that were upgraded to the rating "g+1" at the date t, and β the share of counterparts rated "g" at the date t-1 that were downgraded to the rating *"g-1"* at the date t[2].

In that way, if the rating system leads to a significant impact of ratings migrations, mod PDs' developments would largely be driven by the coefficients α and β; if the rating system is based on PDs variation for a given rating, mod PDs developments would mainly be driven by the variations of the grade-level PDs, given that $(\alpha, \beta) \approx (0,0)$.

2. An empirical assessment of the proposals

To empirically assess the reliability of both approaches, we use corporate transition matrices and default rates extracted from the *Annual global corporate default study and rating transitions* of Standard & Poor's, which covers the period of 1991-2008[3]. Since banks, in order to comply with prudential requirements, tend to estimate PDs by obligor grade from long run averages of one-year default rates, PDs (grade PDs and portfolio PDs) are computed by taking the moving average of default rates over a 10-year period. The portfolio studied is composed of S&P rated companies and for the sake of simplicity, we assume that the Exposure-at-Default (EAD) is the same for all counterparties in the portfolio.

2.1. Portfolio approach. The buffers exhibit the required properties, as they increase in boom periods and decrease in downturn periods (Figure 1). The middle line represents the actual capital requirements computed on the basis of the observed PDs, and the upper line – the capital requirements plus the buffer computed when applying the proposed adjustment. The maximum PD is found in 2003, when the buffer is then zero (Figure 2).

[1] Though there is no clear-cut definition of TTC PD, they are assumed to be more stable over the cycle than Point-in-Time PDs. In the paper, TTC ratings systems are supposed to be based on TTC PDs.

[2] One assumes here that migrations by 2 ratings or more are neglected. Otherwise, the formula could be expanded.

[3] Although that simulation is based on US data, so as to rely on a sufficiently long time span, results would remain exactly the same with European data.

In a second step, one can compute the downturn modified PDs, defined as the maximum of the computed modified PDs. For each time, grade PDs at time t are adjusted using the grade-specific ratio $(\mathrm{mod}\, PD^{g}_{downturn} \,/\, \mathrm{mod}\, PD^{g}_{t})$. The capital buffer is computed as the difference between the amounts of minimum required capital estimated using the original grade PD and the adjusted grade PD.

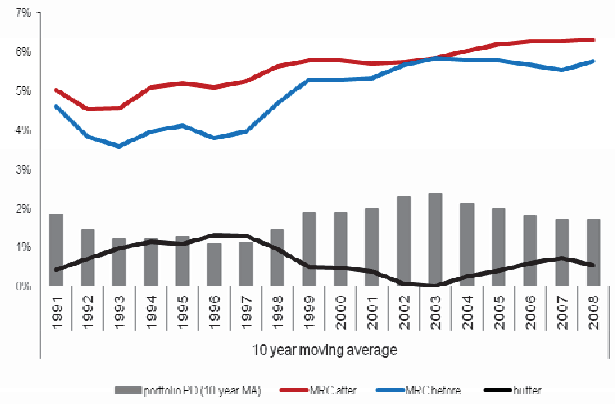

Fig. 1: capital buffer level over time

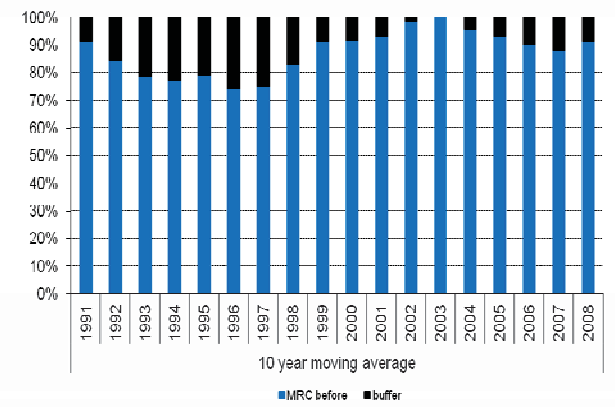

Fig. 2: buffer as a percentage of overall minimum required capital

To test for the robustness of that methodology when using a PiT[1] rating scale, we re-run the computations considering directly the observed default rates as PDs. We find that the buffer is much higher than in the TTC analysis, as it represents 29% of total MRC on average over the cycle against 12% for the 10 year moving average approach.

2.2. Two-step grade level approach. Two-step grade-level and portfolio-level approaches induce a rather similar buffer over the last 3 years (Figure 3). The grade-level capital buffer represents 0.57% of EAD on average, against 0.66% for the portfolio-level capital buffer.

Nevertheless, they prove different before 2005. For instance, capital buffer is never null in the grade-level approach because the highest modified grade PDs are reached at different times (the ratings AAA, AA, A reach their highest PD in 2008, BBB in 2002, BB in 1990, and the two worst ratings in 2001).

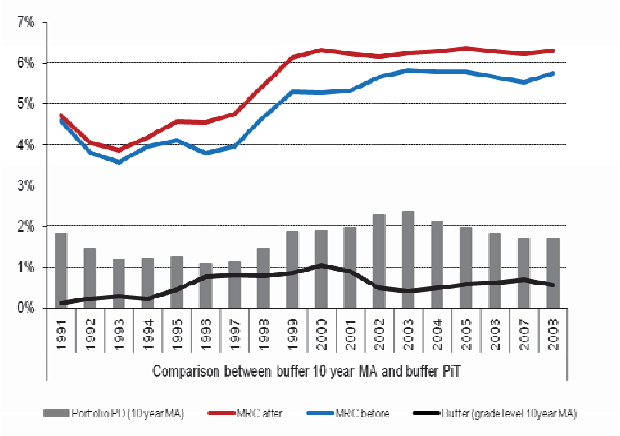

Fig. 3: capital buffer level over time

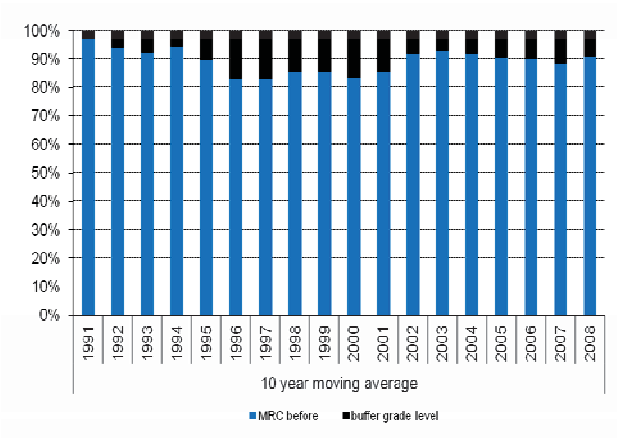

Fig. 4: buffer as a percentage of overall minimum required capital

When computing the MRC from default rates instead of PDs (PDs being moving average of default rates over a given time horizon), the capital buffer appears higher (44% of total MRC) than for a TTC (10-year moving average) approach (10% on average). This supports the argument that the two-step grade-level approach, as expected, is more "PiT-adverse" than the portfolio approach, where the buffer was only 29% of MRC for the PiT portfolio.

2.3. A comparison of both approaches. Figure 5 confirms that:

1. Whatever the methodology used, the buffers in the PiT portfolio are higher and more volatile than in the TTC portfolio. In that respect, the two-step grade-level approach induces higher buffers than the portfolio-level approach for a PiT portfolio, as expected. This could be understood as a significant advantage, so that banks have strong incentives to adopt more TTC ratings philosophies.

[1] In a PiT analysis, the corrective ratio and the Risk Weighted Assets are computed directly from the observed default rates.

2. In a TTC portfolio, both buffers appear of the same magnitude.

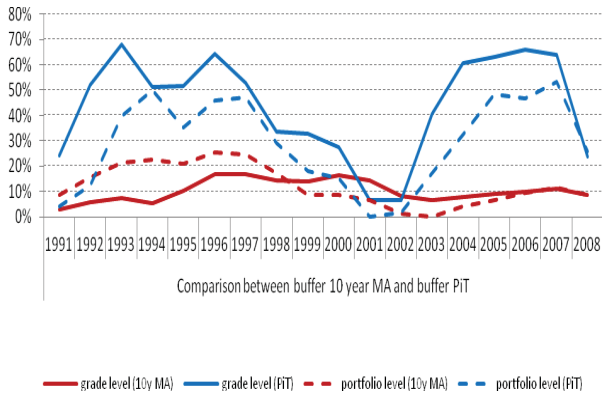

Fig. 5: capital buffer as % MRC after adjustment over the cycle

Moreover, the buffers computed using the two-step level approach are more "Point-in-Time adverse" than the portfolio approach.

Conclusion

Our results show that whatever the methodology used, as expected, the buffers in the PiT portfolio are higher and more volatile than in the TTC portfolio. In that respect, the two-step grade-level approach induces higher buffers than the portfolio-level approach for a PiT portfolio, as expected. This could be understood as a significant advantage, so that banks have strong incentives to adopt more TTC ratings philosophies. In a TTC portfolio, both buffers appear of the same magnitude.

In practice, the robustness of the scaling-factor depends on the use of sufficiently long time-series (including recessionary conditions), which are not easily available for banks. Time series should ideally include one (or more) full business cycle. However, the problem of data availability is expected to be temporary. Moreover, some macro-modeling might be envisaged to infer downturn PDs when historical data are not sufficient.

References

1. Borio, C; Furfine, C. and Lowe, P. (2001). "Procyclicality of the Financial System and Financial Stability: Issues and Policy Options", BIS Papers 1, pp.1-57.
2. Borio, C. (2003). "Towards a macro-prudential framework for financial supervision and regulation", CESifo Economics Studies, 49, pp.181-215.
3. Catarieneu-Rabell, E.; Jackson, P. and Tsomocos, D. (2005). "Procyclicality and the new Basel Accord: Banks' choice of loan rate system", Economic Theory, 26, pp.537-557.
4. Clerc, L.; Drumetz, F. and Jaudoin, O. (2001). Dans quelle mesure les normes prudentielles et comptables sont-elles pro ou contra-cycliques ?", Bulletin de la Banque de France n 87, mars.
5. Danielson, J.; Embrechts, P.; Goodhart, C.; Keating, C.; Muennich, F.; Renault, O. and Shing, H.S. (2001). "An Academic Response to Basel II", Special Paper 130, Financial Market Group London School of Economics.
6. Dietsch, M. and Garabiol, D. (2004). "Du caractère pro-cyclique du nouveau ratio de capital: une analyse empirique sur données française", Banque & Marchés, 69, pp 5-19.
7. Gordy, M.B. and Howells, B. (2004). "Procyclicality in Basel II: Can We Treat the Disease Without Killing the Patient?", Board of Governors of the Federal Reserve System.
8. Segoviano, M.A. and Lowe, P. (2002). "Internal ratings, the Business Cycle and Capital Requirements: Some Evidence from an Emerging Market Economy", Federal Reserve Bank of Boston, pp.17-19, April.