Bank procyclicality and output: Issues and policies

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BANK PROCYCLICALITY AND OUTPUT: ISSUES AND POLICIES

Abstract

The recent global financial crisis has highlighted the importance of the procyclicality of the financial sector. The procyclicality has transformed banks from mitigation mechanisms to amplifiers of changes in economic activity, potentially affecting financial stability and economic growth. The causes of procyclicality can be attributed to market imperfections and deviations from the efficient market hypothesis, while other factors including the Basel-type regulations, accounting standards and leverage have exacerbated it. Several suggestions have been forwarded to attenuate procyclicality, in the form of rules and discretion. They are presented here according to the factors they aim to alleviate. Some of the suggestions have been adopted under the Basel III framework, which explicitly addresses the procyclicality issue.

Keywords: Banking, procyclicality, demand and supply of loans, capital requirements, Basel II and III
JEK Classification: C33, G21, G28

1. Introduction

The long history of economic and financial crises shows that the financial and the banking sectors are inherently procyclical. The discussion resurfaces stronger than ever, in light of the developments, characteristics and aftermaths of the subprime and the euro-area crises. This article reviews the causes and consequences of the intense procyclicality in the banking sector, and its relationship with the real economy, in terms of leverage, credit and output. Further, the article discusses the potential regulatory intervention aiming at the smoothing of the cyclical variation of bank credit.

We are primarily concerned with procyclicality from the macroprudential supervisor's viewpoint, which considers the changes in risk and leverage over the business cycle and how these risks are distributed within the financial system. In this sense, procyclicality of the banking sector is defined as being related to the reinforcing interaction within the financial sector and between the functioning of the banking sector and the real economy, leading to unsustainable economic growth during the upturns and deeper recessions in the downturns (BIS, 2010a; Clement, 2010). In other words, the banking sector can exacerbate cyclical fluctuations, hindering the efficient allocation of resources in the economy and adversely affecting credit growth and financial stability.

A considerable literature exists, both theoretical and empirical, that explains the cyclical behavior of the banking sector. Keynes (1936) and Minsky (1982) argue that informational asymmetry is an inherent problem in the functioning of the financial markets and this uncertainty fluctuates with the real economy. Bernanke and Gertler (1989), and Kiyotaki and Moore (1997) introduce the financial accelerator, which indicates that even relatively small shocks to the economy can be amplified by endogenous changes in the credit market conditions and lead to the propagation of the business cycle. In general, the economic policy, the economic and financial environment and the regulatory framework of banks are factors that contribute to the banking industry's procyclicality (e.g., VanHoose, 2008; Caprio, 2010; Hardouvelis, 2010).

Further, factors such as Basel I and II, accounting rules, credit rating agencies' reports and the use of similar risk management systems have been criticized as they did not help to smooth procyclicality in the banking sector, reinforcing it instead (Kashyap and Stein, 2004; Enria et al., 2004; VanHoose, 2008; Jokipii and Milne, 2008). More precisely, these studies suggest that capital requirements may lead to procyclical behavior, reducing the supply of loans by banks. This can be particularly problematic during recession times, when there is a limited liquidity in the real sector of the economy. As many companies do not have alternative

funding sources, the reduced credit supply leads to a significant decline in economic activity. This high cost of procyclicality on the real economic activity indicates that some actions should be taken to soften the business cycle. Even by the end of 2008, the G-20 agreed on the need to deal with the procyclicality issue and called upon the IMF, the Financial Stability Board and the Basel Committee to identify ways to alleviate it. The De Larosiere report (2009) and the Financial Stability Forum (FSF, 2009) also emphasized the need to reduce procyclicality. Interestingly, the new proposals of Basel III include countercyclical capital buffers, implying that the regulators do attempt to alleviate the procyclical behavior of Basel II in real time.

This paper aims to provide a comprehensive review of the existing literature on procyclicality of the banking sector, and explore certain aspects that have not been addressed and/or adequately explained until recently in the relevant literature. The paper explores the following main directions: First, it focuses on the driving forces of procyclicality in the financial sector. Second, it analyzes the impact that procyclicality has on the banking sector itself and on the real economy. In particular, it analyzes the procyclical behavior of bank profitability, the behavior of demand and supply of loans and their relationship with the economic activity (financial accelerator). Third, it discusses the procyclical behavior of capital requirements, accounting rules, leverage and of other factors like liquidity and credit rating of agencies' assessments. Fourth, it reviews and critically examines a number of proposals (micro and macro-prudential) on mitigating procyclicality, by also analyzing the relevant proposals of Basel III.

In this review article we have deliberately not elaborated on some issues, the most important ones being the following three. First, we are primarily concerned with the US and the European banking systems without, however, attempting a comparison between them. Likewise, we do not examine the role of public debt markets, sovereign bond rates and credit default swaps that notoriously affected the performance of the banking systems during the recent financial crisis. Finally, we explain only briefly the effect of corporate governance on compensation schemes.

The paper is structured as follows: In Section 2, we discuss the causes of procyclicality, which are further distinguished into those that make procyclicality inherent to the financial system and those that enhance or mitigate it. In Section 3, we analyze the results of procyclicality. We show the relationship between procyclicality and profitability and the demand and supply of loans and the role of the financial accelerator. In Section 4 we deal with

the question of whether various forms of existing banking regulations amplify the banking system's procyclicality. We consider the contribution of Basel II, accounting standards and leverage, among others, in enhancing the banking sector procyclicality. The international literature has presented several proposals to mitigate procyclicality, most of which we mention in Section 5. Also, in this Section, we present the decisions made by the Basel Committee in September 2010, concerning procyclicality in the banking sector. Finally, in Section 6 we report the main findings of this study.

2. Causes of procyclicality

This section discusses the main factors that exacerbate the procyclicality of the banking sector. Among these factors we can also include the elements of banking regulation, yet we prefer to devote below a separate section on this important issue. We also provide a brief account of the factors that mitigate procyclicality.

2.1. Deviations from the efficient market hypothesis

The procyclical behavior of banks can be explained first and foremost by deviations from the **efficient markets hypothesis** (ECB, 2005). According to this hypothesis, market participants possess all available information and evaluate it rationally, distinguishing between temporary shocks and events with a long-lasting impact. Consequently, the banks' credit will be counter-cyclical, as banks will be able to perfectly observe and forecast the true state of the economy. In reality though, markets may function in a less than efficient manner. Inefficient functioning of the markets can be explained by several inherent problems of the banking sector (Beattie et al., 1995), the most important of which are the following.

Asymmetric information is considered the main cause of procyclicality (ECB, 2005 and Drumond, 2009) and can take many forms. In its most obvious form, asymmetric information is based on the fact that borrowers have more knowledge than lenders about a project. This relates to the **adverse selection problem**, which posits that the lender is unable to verify one or more of the project's key characteristics. If this mechanism prevails, banks are willing to grant more loans during the upward phase of the cycle when borrowers are less risky, and are more reluctant during the downward phase. Further, informational asymmetries arise due to a fundamental **moral hazard problem**. Existing borrowers are less risky during economic expansions and more risky during downturns. Thus, the monitoring costs change with the business cycle and the underlying costs cause fluctuations in the credit cycle.

The asymmetric information hypothesis is also directly related to provisioning practices, as increasing the provisions lowers the banks' profitability and possibly their dividends, transmitting negative messages (signaling) to the market about the banks' financial condition. Even if the dividends are not reduced, it is difficult for the management of a bank to raise provisions, because of the need to avoid sending negative signals about its loan portfolio quality. Consequently, banks will choose a level of provisions that minimizes negative effects (Rajan, 1994).

Further, deviations from the efficient market hypothesis arise due to the well-known **principal-agent problem**. A conflict of interest may arise between the shareholders and the bank managers, either due to their different risk profiles or due to the shareholders' difficulty in verifying whether the manager has acted in his interest or has made an "adverse selection" (Eisenhardt, 1989; VanHoose, 2007). This may contribute to procyclicality when: (a) managers take excessive risks in search for yield because of high incentives from the shareholders (e.g., high bonuses) or because of decreasing influence of shareholders on the behavior of the banks' managers, which can lead to systemic risk and instability; and (b) borrowers underestimate tail risk, retaining in that way the possibility for excess profits, while lenders risk losing their capital (Landau, 2009a). However, the final effect of the principal-agent problem on risk and, possibly, on procyclicality depends on each bank's shareholder structure. Laeven and Levine (2009) show that: (a) risk-taking varies positively with shareholder structure, and (b) the relation between risk and regulatory capital depends critically on each bank's ownership structure.

Another inherent problem in the behavior of banks causing them to exhibit procyclicality is **herding**. Bank managers and large institutional investors tend to follow their competitors, thereby adding to the market volatility (Rajan, 2005). This is primarily a result of a uniformity in information and technology, which can precipitate sudden changes in market liquidity. Quite a few interrelated theories exist regarding this behavior. First, bank managers try to avoid jeopardizing their position if they follow wrong personal choices (Scharfstein and Stein, 1990 and Rajan, 1994). Second, they anticipate government support in the event of a severe crisis, which adds to the moral hazard mechanism resulting from the presence of safety nets. Third, they tend to capitalize on the situation, as it is common for executive remuneration schemes in banks to depend on the overall performance of the industry (Borio et al., 2001). Fourth, they try to minimize the impact of adverse information released by other (competing) banks regarding the cost of their borrowing (Acharya and Yorulmazer, 2008). According to Athanasoglou (2004), such strategies employed by bank managers could have

contributed to the sharp price fluctuations, in several cases (e.g., the Black Monday incident in the New York Stock Exchange, in October 1987; the devaluation of the Mexican peso in December 1994; the currency crisis of Southeast Asia in October 1997 and of Russia in August 1998, etc.).

Besides these well-established deviations from the efficient functioning of the banking sector, a few other problems exist, that characterize respective market failures, briefly discussed here, in succession. The first of these is the **free-riding problem**, which posits that a bank's management may not consider the impact of their choices on the stability of the financial system, particularly during the upward phase of the cycle. Second, another type of moral hazard arises, stemming from regulatory safety nets: A bank's management is convinced that, in the event of significant financial problems, it can rely on state support. This problem is related to the too big to fail issue and is further analyzed below.

Third, under the **disaster myopia hypothesis**, the behavior of a bank's management (but also that of borrowers) is myopic (Guttentag and Herring, 1986) in the sense that it considers only short-term risks. Thus, these agents assume that they can cope with a significant recession based on prior experience, while underestimating the likelihood of an extremely negative economic event. This happens because banks (or borrowers) tend to "forget" problems in their loan portfolios as time passes since the latest crisis, due to the gradual withdrawal of experienced personnel, the softening of bank lending standards and the decreased ability of stakeholders (e.g., shareholders, supervisors, etc.) to control the bank's management.[1] Finally, under the **cognitive dissonance hypothesis**, a bank's management engages in voluntary or involuntary misinterpretation, oversight or rejection of the available information to justify past choices that could have been wrong.

2.2. Economic policy

Monetary policy can contribute significantly to strengthening or mitigating procyclicality through its impact on credit demand and supply or the level of lending rates (ECB, 2009c). The literature identifies three main channels through which monetary policy affects the banking sector.

The first is the usual interest rate channel of monetary policy through which loan demand is affected. This implies the standard transmission mechanism of low policy rates

[1] In light of this information, see also the institutional memory hypothesis (Berger and Udell, 2002). This hypothesis is linked to changes in bank financing during the credit cycle and not the business cycle. The authors use a sample of U.S. banks between 1980 and 2000 (including almost two economic cycles) and find evidence to support this hypothesis.

through increased loan demand, investment opportunities and economic growth. Second, the credit channel, which can further be distinguished into the bank lending channel (also referred to as the narrow credit channel) and the balance sheet channel. The first implies that any change in monetary policy will affect the credit supply through the health of the banks' balance sheet. The related literature shows that a bank capital channel can also exert its influence: A change in the interest rate triggers a change in the value of the financial assets, resulting in gains or losses on banks' trading books. This affects the banks' capital adequacy, and therefore, their ability to lend (ECB, 2009c, Sections 3 and 8.2; Borio and Zhu, 2008). In turn, the balance sheet channel (also called the broad credit channel), suggests that a decrease in the interest rates tends to increase the value of the assets used as collateral by firms and households to obtain a loan, thereby reducing the borrowing costs and opening up the possibility of borrowing a larger amount. The opposite is true when the interest rates increase (ECB, 2009c).

Third, the risk taking channel, which can be defined as the impact of changes in the policy interest rates on risk perceptions or risk tolerance. This channel operates through three main mechanisms: a) the effect of interest rates on cash flows, revenues and asset values of enterprises and households, b) the relationship between the market interest rates and target rates of return, and c) the strategy concerning monetary policy communication functions and the reaction function of the Central Bank (Borio and Zhu, 2008). Several studies (Altunbas et al., 2010; Adrian and Shin, 2009; ECB, 2009a; Delis et al., 2012) show that setting short-term rates at low levels over the past decade contributed to the increase in the level of risk in the banking industry, providing evidence for this channel. Other studies show that the level of short-term interest rates reduces the incentive for screening potential borrowers (Dell'Arricia and Marquez, 2006). This literature naturally raises questions about the suitability of the Central Bank rates as a means of achieving both price and financial stability (Barrell et al., 2010; Goodhart and Persaud, 2008).

2.3. Credit rating agencies

Normally, credit rating agencies aim to rate borrowers "through-the-cycle." This means that credit rating agencies will consider the downside scenario when assessing the probability of default. However, this does not imply that these agencies' ratings are a-cyclical: If the recession turns out to be worse than expected, it will inevitably cause more downgrades. Moreover, when there are significant changes in the rated companies' financial position, these agencies tend to revise their assessments by more than one notch, and these are significantly

influenced by the economic cycle (Amato and Furfine, 2003). This partly explains the fact that both during the subprime crisis and in the earlier ones (such as the Mexican crisis in 1994 and the Asian crisis between 1997 and1999), these agencies made more downgrades, which enhanced procyclicality (Borio et al., 2001).[2] In contrast, during the upward phase of the cycle, the improved ratings increase asymmetrically. In other words, rating agencies were backward-looking rather than forward-looking in their assessments. These procyclical ratings during a crisis may contribute to banking procyclicality in the following two ways: First, they will increase risk weights used by international markets, because market participants tend to withdraw funds from firms that have been downgraded, leading to less external funding for banks. Second, as domestic firms may also be downgraded in a crisis, capital requirements for banks will rise, leading to a further reduction in credit supply (Andritzky et al., 2009; Amato and Furfine, 2003).

2.4. Other factors affecting procyclicality

The factors listed below refer to financial sector practices that tend to enhance the banking industry's procyclicality.

The first factor is the use of automated risk management systems and in particular Value at Risk (VaR).[3] The use of automated risk management systems can decrease (increase) investors' risk aversion during periods of high (low) volatility. This is because VaR (or alternatively a portfolio's potential loss) is typically calculated using recent data and current asset prices. Note that VaRs are calculated based on estimations regarding correlations between certain variables. However, these correlation coefficients tend to increase during crises periods, implying that the benefits of diversification disappear when they are most needed (Longin and Solnik, 2001). Consequently, banks should calculate the conditional VaR (CoVaR), or the VaR of the financial system, depending on the number of institutions in distress (Adrian and Brunnermeier, 2008).

Moreover, market volatility (and by extension, procyclicality) is influenced by the fact that financial firms tend to use similar risk management systems, leading to uniformity in their

[2] It is also argued that credit rating agencies' assessments are less procyclical than provisions carried out by banks (Borio et al., 2001), because the former assess the probability of a firm's default over a longer time horizon (Borio and Zhu, 2008). Moreover, it is difficult for credit rating agencies to forecast a major crisis, so they are sometimes forced by the market to proceed to downgrades (Haldane et al., 2001).

[3] VaR is a portfolio's maximum daily loss for a specified time and with a specified confidence interval. For example, if a portfolio's one day VaR is 50 basis points with a confidence interval of 99%, then it is expected that this portfolio will, on average, exhibit losses of over 50 basis points in one out of a hundred days.

investment choices and their reactions to changes in the fundamentals, which partly explains banks' herding behavior (Hardouvelis, 2010).

Last but not least, executive remuneration schemes in the financial sector play an important role in generating crises. Remuneration schemes depend on the growth rates of revenues and profits, but the underlying risk tends to be ignored. The U.S. wage structure and the amount of bonuses (mainly stock options) distributed to banks' executives could induce risk-taking (Chen et al., 2006). This phenomenon became pronounced after the deregulation in the U.S. banking industry and the efforts of the banks to gain market share (Davis and Zhu, 2004). The unsatisfactory functioning of corporate governance regimes (as shareholders demanded increasing returns at a time when the market returns were low) was also a contributing factor on this front. However, it should be noted that the relevant literature (theoretical and empirical) is nonetheless not conclusive regarding the relationship between the structure of executive remunerations schemes and risk-taking behavior (VanHoose, 2011).

2.5. Factors analyzed above that can also mitigate procyclicality

It has been argued that market imperfections could also lead to the mitigation of banking sector's procyclicality. Specifically, Bikker and Metzemakers (2005) suggest that for the banks in the OECD countries during the 1990s there was a positive correlation between profitability and their provisions, reflecting countercyclical behavior. This positive correlation is called **the income smoothing hypothesis** and can be explained by the fact that a bank's management may wish to avoid major changes in profitability levels and, therefore, will choose to increase provisions in times of higher profitability, so that their net income does not vary significantly from year to year.

Note, however, that increased profitability will not necessarily lead to increased provisions. The following two hypotheses, among others, influence provisions: First, the **capital management hypothesis**, which posits that banks with a low capital adequacy ratio make higher provisions to improve this ratio. Second, the **tax shield hypothesis**, which suggests that the tax deductibility of provisions from taxable income may be an incentive for banks to increase provisions.

3. The effects of banking-sector procyclicality

The determinants of procyclicality analyzed above can also be affected by the extent of procyclicality in the banking sector. This is a standard endogeneity problem of most of the issues associated with the procyclicality. We analyze the main effects that procyclicality has

on the efficient functioning of banks, their performance, the demand and supply of credit and the degree of risk of the financial intermediaries.

3.1. Efficient functioning of banks

Procyclicality in the banking industry may not be damaging, if it is solely the outcome of cyclical evolutions in the real economy. In contrast, it is generally quite damaging if it is caused by the financial system itself (Landau, 2009a). There are many examples where procyclicality disturbs the efficient functioning of banks.

The first is the transformation of the banking system from a mitigation mechanism to a reinforcing mechanism of the economic cycle. The banking system should ideally provide a safety net to enterprises and households to mitigate economic volatility. However, as noted above, due to procyclicality, banks usually finance risky investments with marginally positive or even a negative net present value in the upturns, while they do the opposite during the downturns. Thus, the banking system, rather than compensating for swings in the economic activity over the cycle, makes them even more intense.

Second, procyclicality distorts the proper allocation of resources. Specifically, during the upward phase of the cycle, resulting from a lowering in bank lending standards, increased competition and the underestimation of risk, loans are granted to investments with marginally positive or even a negative net present value. In downturns, even investments with positive net present value do not receive bank financing. In fact, loans that have been approved in the upward phase of the business cycle exhibit a higher probability of default (Jimenez and Saurina, 2006).

Third, procyclicality affects the stakeholders' and especially the supervisors' ability to control the banks' management, due to the fact that problem loans tend to emerge with a lag (Berger and Udell, 2002). This may explain why supervisory stringency can fluctuate over the business cycle (Berger et al., 2000; Krainer and Lopez, 2009). We analyze this further in the Section dealing with banking regulation and supervision.

3.2. Profitability

The empirical literature has shown that bank profitability is characterized by procyclical behavior. Economic activity affects the interest income through loan supply to the private sector (Jimenez et al., 2009) and provisions, as well as the quality of banks' assets (Bikker and Metzemakers, 2005; Lucas and Saurina, 2002). Also, structural factors (e.g.,

competition, customer-bank relationships, capital market development, etc.) are important determinants of profitability over the business cycle.

Demirguc-Kunt and Huizinga (2000) and Bikker and Hu (2001) highlight a positive relationship between GDP and bank profitability. Athanasoglou et al. (2008), using deviations from the trend in the Geek real GDP for the period 1985-2001, conclude that the cycle affects Greek banks' profitability, even after accounting for factors that are directly associated with it, such as losses from bad debts, provisions to cover credit risk and market structure.

During periods of GDP growth, bank loan demand grows and provisions decline, leading to an increase in bank profits. Furthermore, the GDP growth usually leads to higher stock market prices, which also positively affects the banks' profitability, due to income from higher transaction fees and capital gains. Finally, banks may, depending on the competitive conditions, increase their interest rate margins. Conversely, during recession times, profitability collapses due to the increased provisions, bad debts and reduced loan demand and supply. In addition, if a financial crisis has caused the recession, then banks may face higher funding costs due to increased systemic risk.

The procyclicality of a bank's profitability is transmitted through the bank capital channel, mainly because of the borrowers' inability to meet their debt obligations. Specifically, when the economy is in recession, the banks' profits decline, and if a capital increase by issuing new shares is not feasible, then banks may be forced to reduce their lending in order to maintain their capital adequacy. This drop in lending leads to a further decline in the economic activity.

3.3. Demand and supply of loans

It is widely acknowledged that bank lending is cyclical, i.e. banks in both USA end EU respond to changing economic activity (see e.g., Gambera, 2000; Salas and Saurina, 2002; Pain, 2003). Specifically, during downturns, banks limit their credit supply. At the same time, the demand for new credit is weak, because there are limited investment proposals with positive net present values (Berlin, 2009). In other words, during economic downturns a simultaneous decline in both the supply and the demand for credit is usually observed. In a severe crisis, as in 2007, the decline in the supply of loans, at least initially, is greater than the decrease in demand. This is because the loan applications for investments with positive net present value tend to be rejected following a significant increase in the risk premium, reflecting the increased risk aversion of banks during economic downturns.

Several studies have examined the behavior of loan demand and supply during various phases of the economic cycle. The behavior of firms regarding loan demand has been examined by Jimenez et al. (2007), who find that subsequently-bankrupt companies increased their (median) rate of use of their credit lines by 71% a year before their bankruptcy versus 43% for firms that did not go bankrupt. As bankruptcies tend to increase when GDP falls, it is likely that part of the increased use of credit lines can be attributed to firms that went bankrupt. Moreover, Jimenez et al. (2010) and Albetrazzi and Marchetti (2010) point out, for Spain and Italy respectively, that during tight economic and monetary conditions, financially weak firms may not be able to have access to adequate bank credit. This fact may be enhanced by a "flight to quality" tendency by banks (see Albetrazzi and Marchetti, 2010 and Bernanke et al., 1996), but may also be weakened because of "evergreening" strategies (i.e., lending more money to firms in distress so that the latter do not default). This policy is especially true for smaller banks (Albetrazzi and Marchetti, 2010) owing to tighter relationship lending (Puri et al., 2010).

Borrowers' cash flows and net worth tend to decline during the worsening economic conditions, elevating their probability of default and consequently their premium of external finance. Thus, their access to credit is hampered, resulting in decreased spending, investment and output, and creating an accelerating feedback loop between the level of economic activity and credit institutions. The opposite occurs during improving economic conditions. Bernanke and Gertler (1989) term this loop financial accelerator, which implies that even relatively small shocks to the economy may be amplified by endogenous changes in the credit market conditions and lead to the propagation of the business cycle (Kiyotaki and Moore, 1997, Bernanke et al., 1998 and Bernanke, 2007).

The financial accelerator is rationalized theoretically within the asymmetric information and principal agent theories. These theories imply that borrowers with relatively high agency costs are expected to be more severely hit by worsening economic conditions and be forced to reduce their economic activities more than other borrowers, because they will face greater difficulties in accessing credit (flight to quality, Bernanke et al., 1996). Christiano et al. (2010) add to the financial accelerator analysis the "Fisher deflation" effect, which interacts with the former and exacerbates the reaction of the business cycle when the price level and output move in the same direction.

Loan supply is determined by several factors, the most important of which are bank capital, economic activity and competition in the banking sector. Regarding procyclicality, the

contribution of bank capital and economic activity are very significant.[4] Changes in a bank's capital may induce changes in its loan supply, even if there is no change in the net present value of loans. This fact is reported in many empirical studies, including Bernanke and Lown (1991) and Furfine (2000) for the U.S. banks,[5] and Jimenez et al. (2010), Albetrazzi and Marchetti (2010) and Puri et al. (2010) for the Spanish, Italian and German banks, respectively.[6] Concerning capital buffers (the difference between a bank's total risk-adjusted capital and the minimum capital requirement), Marcucci and Quagliariello (2008) report that Italian banks reduced their loan supply between 1990 and 2004 because of a decline in capital buffers. Francis and Osborne (2009) present similar findings for the UK banks.

Loan supply is an important determinant of economic activity (Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997; Diamond and Rajan, 2005). However, it is difficult to explain the procyclicality of banks' loan supply, as it is difficult to distinguish between changes in loan demand and supply. Kashyap et al. (1993) find that in the U.S. during 1964 and 1989, the decline in loan supply contributed significantly to the GDP decline. However, there are indications that the decline in economic activity during the period 1980-2009 in the G-7, reflects a falling loan demand rather than supply (De Nicolo and Lucchetta, 2010). The effect of loan supply on economic activity depends on various factors, including changes in the interest rate and the proportion of the economic activity financed by banks (Bernanke and Lown, 1991). For example, in the U.S. (where bank financing is relatively low) between 1965 and 2004, the amount and cost of bank financing did not substantially impact economic activity (Driscoll, 2004). In contrast, for the euro area (where bank-based financing is higher), Cappiello et al. (2010) state that during the period 1999-2008, loan supply positively impacted the economic activity.

Moreover, the business cycle has been found to influence bank credit standards. Changes in bank credit standards during the business cycle are reflected in total financing, the cost of borrowing (lending rate and other charges, Asea and Blomberg, 1998, Bliss and Kaufman, 2003, Jimenez and Saurina, 2006, Cappiello et al., 2010 and Bernanke and Lown,

[4] Bank capital here refers both to economic as well as regulatory capital. Regarding the former, Gropp and Heider (2009) and Berger et al. (2008) indicate that banks actively manage their capital structure, while Berrospide and Edge (2010) hold the opposite view. Regarding regulatory capital, several studies in various countries have shown that capital adequacy rules tend to restrict bank lending (Bernanke and Lown, 1991; Berger and Udell, 1994; Peek and Rosengren, 1995), the exception being Bikker and Hu (2001).

[5] Berrospide and Edge (2010) also find that the U.S. banks' level of capital affects private sector financing to a lesser extent than economic activity and banks' risk appetite.

[6] Jimenez et al. (2010), Albetrazzi and Marchetti (2010) and Puri et al. (2010) conclude that low capital combined with low liquidity reduces the loan supply during a time of falling economic activity. However, during economic expansions, banks with lower capital and liquidity ratios are more likely to approve a loan.

1991), the amount of collateral required (Jimenez and Saurina, 2006) and maturity (Gordy and Howells, 2006). Banks tend to significantly ease their credit standards during the upturns and stiffen them during downturns.[7] Procyclicality of credit standards is associated with the banks' assets, capital adequacy and capital structure, willingness to take risks, profitability, as well as other factors like risk assessment and risk management practices and the functioning of the money markets.

More specifically, U.S. banks change their bank credit standards depending on the current phase of the economic cycle, even after considering a loan demand (Berger et al., 2008). Similar findings apply to the European banks for the period 2003-2009 (Hempell and Sorensen, 2010). Also, the high GDP growth is accompanied by softer bank credit standards, increased loan amounts and maturities (ECB, 2009a), as well as by reduced collateral requirements (Jimenez and Saurina, 2006). In Greece, the decline in GDP during the last quarter of 2009 was accompanied by more stringent bank credit standards and higher rejection rates for small and medium enterprises, despite a steady business loan demand (Bank of Greece, 2010).

4. Banking regulation and procyclicality

This section deals with the question of whether the various forms of existing banking regulations amplify the banking system's procyclicality. We focus on the impact of capital requirements on procyclicality, the impact of other regulations inherent in the Basel II framework, and the role of the accounting standards. Finally, we consider the proposals outlined in the Basel III structure and their role concerning procyclicality.

4.1. Arguments in favor of the counter-cyclical behavior of Basel II

It is generally argued that the proper implementation of the framework's recommendations and guidelines does not necessarily lead to an exacerbation of the banking industry's inherent procyclicality. Basel II can lead to an amplification of procyclicality when at least three causal mechanisms are present (Saurina, 2008).

[7] The change in bank credit standards is obviously associated with credit risk. This risk is overstated (understated) in the downward (upward) phase of the cycle. Therefore, the interest margin charged is higher (lower) than the one corresponding to the "actual" level of risk that this loan incorporates. In particular, during the downward phase of the cycle, rising interest rates (due to the increased risk premium) may cause the net present value of an investment to turn negative and lead to the rejection of the loan requested. ECB (2009c) notes that the tightening of bank credit standards for loans from mid-2007 onwards is mainly reflected in a rise in interest rate margins.

The first is that capital requirements have to increase (decrease) in the downward (upward) phase of the cycle. Basel II contains the following mechanisms designed to minimize this problem: On the one hand, banks are recommended to use a time horizon of at least one business cycle to estimate the probability of default and loss-given default, although banks need to use only one year of data. If banks follow this recommendation, the relative change in capital requirements between the peak and the lowest point of the cycle is reduced to almost 1/5 compared with using one year of data. It is now widely recognized that the proper application of stress tests can offset Basel II's procyclicality (Taylor and Goodhart, 2004).

The second mechanism stems from the fact that banks' capital adequacy - as set forth by the Pillar I of Basel II – has to be close to its minimum. In practice, however, banks hold capital, significantly higher than the one set by capital requirements.[8] Moreover, because Pillar III requires improved transparency, it may be difficult for a bank to retain its capital adequacy levels near the minimum throughout the entire business cycle and not to provoke a reaction from stakeholders. The importance of capital buffers in mitigating significantly Basel's procyclicality has been confirmed empirically by Peura and Jokivuolle (2004) and Heid (2007).

The third mechanism is related to the fact that loan demand and supply may not depend directly on banks' capital buffers. Zhu (2008) argues that studies suggesting that procyclicality may be exacerbated by Basel II[9] should be considered with caution, because they i) consider a passive over an active portfolio strategy; ii) consider only regulatory capital, although it is known that banks maintain higher total capital (part of which are capital buffers); and iii) do not address the dynamic evolution of regulatory capital in the course of the economic cycle. Zhu (2008) also notes that during a recession, Basel II's increased volatility in regulatory capital requirements (compared with Basel I), does not necessarily lead to a reduction in loan supply (i.e., a procyclicality issue is not necessarily operative). This is because banks, during upturns, do not choose their lending portfolio according to minimum capital requirements. Furthermore, Zhu (2008) argues that capital adequacy rules enhance the

[8] According to Jokipii and Milne (2008), the EU-25 banks' capital buffer, on average, amount to 3.77%. The size of the capital buffer is assumed to be determined by factors such as the risks undertaken, the requirements of credit rating agencies, the imposition of fines for violation of capital adequacy rules, the need to borrow from the markets with a relatively low rate and to prevent a dividend reduction in case of a profitability shortfall (Jokipii and Milne, 2008; Saurina, 2008).

[9] Zakrajsek et al. (2001) find no significant procyclicality amplification from regulatory capital, while Ayuso et al. (2004) and Stolz and Wedow (2005) argue that it is not clear whether Basel II amplifies procyclicality. It is, however, expected that the increased volatility in regulatory capital may also influence the economic capital (Taylor and Goodhart, 2004).

stability of individual banks and the financial system, although his view is challenged by Demirguc-Kunt and Detragiache (2009) as regards Basel Core Principles and by Delis et al. (2012) as regards capital regulation in general.

In the theoretical literature the implementation of Basel II framework has been shown to lead to a mitigation of procyclicality, because banks are expected to alter their loan portfolio according to the state of the economy (see ECB, 2009b and the literature therein). This is explained by the fact that during a recession, capital requirements for loans to firms with high credit ratings are expected to increase more than the loans to firms with low credit ratings (Kashyap and Stein, 2004). This occurs because of the possibility of a further deterioration in the credit rating of firms with already low credit ratings is limited (since these firms will face bankruptcy), while the higher-rated firms have more room for their ratings to deteriorate. Consequently, banks will reduce lending to creditworthy firms and increase lending to firms with lower credit ratings.

However, in reality, it is unclear whether bank access would be restricted to firms with high credit ratings during a recession. More specifically, the U.S. banks have been found to have increased their interest rate margins to high-risk (low-rated) firms during the 2001 recession (Basset and Zakrajsek, 2003). Also, a negative correlation is usually found between the interest rates charged on loans to firms and their credit ratings (Bernanke, 2009). Therefore, firms with high credit ratings are not expected to face difficulties in their bank financing.

Basel II's procyclicality may also be attenuated by the counter-cyclical behavior of capital requirements for operational risk. According to the Basic Indicator Approach and the Standardized Approach, capital requirements for operational risk are calculated as a percentage of total revenues. However, during a recession, total revenues tend to decrease (mainly due to the decline in revenues from financial activities) and, therefore, capital requirements for operational risk will also decline (Allen and Saunders, 2004).

4.2. Capital regulation and procyclicality

The Basel II framework has received significant criticism regarding its contribution to strengthening procyclicality (Report de Larosière, 2009). This criticism relates to (a) the volatility of capital requirements and (b) the relationship between capital buffers, provisions and equity and the business cycle.[10]

[10] For a relevant review of theoretical literature, see VanHoose (2008) and Drumond (2009).

The volatility of capital requirements depends on the approach on which these are evaluated.[11] More precisely, when the standardized approach is used to evaluate capital requirements, asset weights are determined by the credit ratings of companies financed and are as procyclical as the ratings from the credit rating agencies. Capital requirements for credit risk under the IRB approaches is calculated based on six parameters, of which the following three are affected by the economic cycle (ECB, 2005):

- Probability of default: The cyclical pattern of the probability of default has been confirmed empirically by Altman (2004), Fama (1986), and Barnhill and Maxwell (2002), although it is unclear whether it affects the high-or-low-rated firms.
- Loss-given default: Loss-given default is related both to the state of the economy (Altman et al., 2002; Acharaya et al., 2004) and probability of default (Allen and Saunders, 2004). Loss-given default tends to rise during downturns, amplified by the fact that recovery rates for defaulted loans are lower during recession than during expansion. Note that during recessions the value of the collateral used to reduce the actual loss for a bank tends to decrease.
- Exposure at default. This is higher during recessions, as customers tend to fully utilize their credit lines (Jimenez et al., 2007).

The volatility of capital requirements due to Basel II (and the consequent exacerbation of procyclicality) has been confirmed empirically. More precisely, Kashyap and Stein (2004) show that according to Standard and Poor's and the KMV models the capital charge[12] is estimated at 30-45% and at 70-90%, respectively. The authors also estimate that any capital buffers created during expansions will be insufficient to deal with procyclicality in a major recession. Therefore, Basel II enhances the banking sector's procyclicality, as it relates the capital requirements for a loan to its probability of default. Studies by Erwin and Wide (2001), Segoviano and Lowe (2002), Peura and Jokivuolle (2004), Gordy and Howells (2006) and Repullo and Suarez (2008) offer similar conclusions, although their estimates regarding the

[11] There are three alternative approaches of varying degrees of sophistication under Basel II to compute capital requirements: the standardized approach, the foundation Internal Ratings-Based (IRB) approach and the advanced IRB approach. The standardized approach uses ratings from the credit rating agencies to assess the credit risk of the financed companies. Basel II sets a weighting of 75% for loans to companies with an annual turnover of up to 2.5 million euros, and a weighting equal to that of the government rating with a minimum of 100%, for loans to companies with an annual turnover of over 2.5 million euros. According to the foundation IRB approach, each bank estimates the probability of default and exposure at default, while the loss-given default is estimated by the supervising authority. Under the advanced IRB approach, the bank also estimates loss-given default.

[12] Additional capital that emerges from the models used by the credit ratings agencies Standard and Poor's and KMV, for banks in Europe and the U.S. needed in order to maintain minimum capital adequacy in the period 1998-2002.

impact of Basel II on regulatory capital vary considerably, probably due to different samples of banks and methodologies used. Also, Repullo and Suarez (2008) conclude that Basel II is more procyclical than Basel I. Finally, VanHoose (2008) addresses the issue of the extent of procyclical effects caused by capital regulation, arguing on the basis of empirical evidence that these effects are likely to be mild.

Another branch of this literature focuses on the relationship between capital buffers and the economic cycle. Jokipii and Milne (2008) argue for the presence of a negative relationship between European banks' capital buffers and the GDP over the economic cycle (1997-2004), which is assumed to amplify the procyclicality caused by Basel II. Ayuso et al. (2004) and Stolz and Wedow (2005) concur with these conclusions for the Spanish and German banks, respectively.

A series of studies on the relationship between provisions, equity capital and the economic cycle lead to the usual conclusion regarding the presence of a negative relationship between provisions and the GDP (Bikker and Metzemakers, 2005; Borio et al., 2001; Laeven and Majnoni, 2003; Craig et al., 2006). This problem is mitigated by the fact that banks tend to make more provisions when their profits grow, a behavior attributed to the income smoothing hypothesis (Arpa et. al., 2001 for the Austrian banks). However, there is a significant variation in the provision policies among the banks of various countries (Bikker and Metzemakers, 2005). In the USA, the accounting guidelines for loan loss reserves established by the Financial Accounting Standards Board (FASB) might have enhanced procyclicality by preventing banks from increasing provisions in the upward phase of the business cycle and requiring them to increase provisions in the downward phase of the cycle, leading banks to restrict further their lending activities (Balla et al., 2012).

Apart from the contribution of Basel II on procyclicality through capital and provisions, this framework has also been criticized simply for its failure to protect against a crisis. One of the arguments proposed is that the capital requirements calculation is based on market prices and, therefore, regulatory capital inevitably follows the pattern of the cycle. Furthermore, Pillar III acts as a means of pressure for banks with high capital adequacy ratios during the upward phase of the cycle, because shareholders will demand returns on capital equivalent to the ones from banks with lower capital. Thus, banks will be pushed to take on higher risks in search for yield, rather than to retain high capital adequacy ratios in order to address future downturns (Persaud, 2008a). However, we should note that the empirical literature has shown that privately and publicly held banks exhibit equivalent levels of risk, with the latter holding more capital (e.g., Kwan, 2004).

The de Larosière report (2009) also states that the global financial crisis of 2007 revealed the tendency for Basel II to generate procyclical behavior (although it is recognized that in this respect Basel II is an improvement compared with Basel I) and that a "fundamental review" was required in three main directions. First, market volatility was underestimated, mainly because recent data that does not capture fat tail outcomes was used. Second, the ability of banks to manage risks was overestimated. Third, the assumption that risks would be diversified through securitization, reducing thereby systemic risk, proved incorrect.

From the analysis in this chapter, we can conclude that Basel II appears to increase the volatility of capital requirements over the business cycle. It is only because capital plays a fundamental role in loan supply, that we can conclude that the banking system's procyclicality tends to be amplified by Basel II. The magnitude and scale of this amplification depends on several factors such as: the size of capital buffers,[13] the approach adopted for computing capital requirements, the banks' portfolio composition during the business cycle, the nature of the rating system used by banks, and the appropriate use of the time horizon for the estimation of probability of default and loss-given default (Drumond, 2009). In his survey study, VanHoose (2006, p.4) notes that "implementation of risk-based capital requirements adds to the procyclicality of bank credit and feeds back to generate procyclical impacts on economic activity." Similar arguments are proposed by Goodhart et al. (2004) and Drumond (2009).

However, it should be recognized that Basel II's risk sensitivity in the calculation of capital requirements has important merits. Indeed, Basel II is considered by many empirical and theoretical studies as an important factor that led banks to improve their practices for monitoring and managing risks (see Borio and Zhu, 2008, and references therein).

Basel II has not yet been fully implemented, either in the European Union or in the U.S. Therefore, in most of the studies presented in the earlier sections (e.g., Kashyap and Stein, 2004; Peura and Jokiunolle, 2004) the empirical analysis is referred to the expected operation of Basel II rather than the actual one. Therefore, the Basel Committee of Banking Supervision (BCBS, 2010a) holds that it is premature to determine whether Basel II is more cyclical than expected. In any case, it is argued that an optimal system of capital requirements that can offset procyclicality should be able to closely track the business cycle. In other words, an idea gaining ground in this literature is that capital requirements should be relatively high in the upward phase and low in the downward phase of the business cycle.

[13] Basel II's procyclical behavior affects mainly banks with marginal capital adequacy and liquidity, while banks with capital levels significantly higher than the requirement will only be affected during a major crisis (ECB, 2009b).

4.3. Leverage, asset prices and procyclicality

Leverage has been shown in conjunction with mark-to-market valuation as highly procyclical. U.S. banks tend to increase their leverage and investments in risky assets during the upturns of the business cycle and reduce them during recessions (see Berger et al., 2008 for commercial banks; Adrian and Shin, 2008 and 2012 for investment banks). In Europe, the leverage of (mainly) investment banks is procyclical while that of (mainly) commercial banks is not (Baglioni et al., 2012). This procyclicality not only exerts a negative impact on the real economy and financial stability, but also increases the probability of default of the banks.

Between 2003 and 2007, owing to a significant rise in asset prices, the leverage of European commercial banks rose, unlike that of U.S. banks. In fact, the leverage of U.S. banks was higher than what was shown in the financial statements, due to structured products and off-balance sheet items. Maturity mismatch between assets and liabilities was significant, as banks financed long-term investments with short-term borrowing from the markets. Post the crisis outbreak, a reduction in asset prices and efforts by the banks to restore leverage to target levels triggered a deleveraging process that caused significant losses to banks.[14] Naturally, this affected their capital base and led to a loss of trust among the members of the financial system. International money and capital markets were transformed within a very short time period (particularly, after the collapse of Lehman Brothers) from liquid to illiquid, and the interbank market ground to a halt. Forced sales of financial assets at extremely low prices by banks trying to acquire the necessary liquidity exacerbated the problem and led them to withdraw credit precisely when the financial sector was under most stress.

The literature identifies six (6) market practices which have contributed to an increase in the procyclicality of leverage in the financial system and magnified the procyclicality of the loan supply. The first relates to the use of the mark-to-market valuation method and VaR, without considering the "through the cycle" volatility. Based on the results produced by these methods, adjustments are made to banks' trading and banking books. Second, contagion in the interbank market transmitted the shocks very quickly and generated systemic risk. Third, the over-the-counter derivative contracts were activated during the stress period. Fourth, the margin requirements on derivatives played an important role in exacerbating the systemic event. For example, IMF (2007) observed increased margins in most countries in the summer of 2007. Margin changes reinforce procyclicality, particularly in combination with the

[14] Banks appear to set a target level of leverage and to react to deviations of the actual levels of leverage from this target level (Adrian and Shin, 2008; Baglioni et al., 2012).

creation of a self-reinforcing cycle of liquidity constraints and rising losses on the existing positions (Brunnermeier and Pedersen, 2008). However, it is argued that the margin can also be counter-cyclical, when expressed as a percentage of the instrument's nominal value and not at its current market value (Hardouvelis, 2010). Fifth, the recognition of unrealized profits on structured products, in spite of the associated risks still remained in the banks' portfolios. Finally, the use of alternative accounting methods to hedge accounting added to the confusion and increased informational asymmetry.

4.4. Accounting standards and procyclicality

To determine the role of accounting standards (especially of fair-value accounting) in amplifying procyclicality we need to examine whether they increase the volatility of banks' earnings and capital and whether this volatility affects bank credit standards. Moreover, the current accounting standards should be compared with alternative accounting methods. The issues raised in this section concern mainly the International Financial Reporting Standards (IFRS) rules rather than the American Accounting Standards (US GAAP) ones.

4.4.1. Potential drawbacks of current accounting standards

The main potential drawbacks of the current accounting standards regarding procyclicality refer to: (a) the increased volatility caused to banks' financial statements, (b) the rules concerning the incurred and expected losses in loan portfolios and (c) the impact of accounting standards on banks' lending standards.

As far as the increased volatility in the banks' financial statements is concerned, there are indications that the large European banks use fair-value accounting, which increases volatility following shocks to interest rates, share prices and property prices (Enria et al., 2004). It is possible, however, that this increased volatility does not reflect a change in fundamentals, but may rather be the outcome of market imperfections (Borio and Tsatsaronis, 2006), random effects and / or speculation (Platin et al., 2008; Vinals, 2008). This problem is exacerbated in markets with limited liquidity and trading activity, due to the interaction of these factors, affecting both the speed and the level of leverage and asset prices[15] and thereby increasing systemic risk (Shin, 2006). Therefore, banks with a short-term investment horizon may choose to act according to their expectations regarding short-term price movements,

[15] It is argued, that fair-value accounting can significantly impair market liquidity, thereby affecting prices of financial assets, banks' capital adequacy and, ultimately, their solvency (Persaud, 2008b). In markets with limited liquidity, prices of financial assets are largely determined by the buyer's liquidity (Allen and Carletti, 2008).

thereby amplifying the current trend in prices.[16] Thus, the fair-value accounting method leads to an endogenous volatility of prices (Platin et al., 2008a; 2008b), making procyclicality endogenous. Moreover, the volatility caused by this method may increase because of estimation errors, inherent volatility and the use of the mixed attributes model (i.e., the application of fair-value accounting to some instruments and amortized cost accounting to others) when preparing financial statements, thus reducing the net effect (Barth, 2004).[17]

The use of fair-value accounting is not limited to the banks' trading portfolio, but can also be applied to the loan portfolio. Therefore, changes in the interest rates can lead to significant changes in the value of the loan portfolio, although the bank's intention may be to hold these loans to maturity (Tumpel-Gugerell, 2010; Enria et al., 2004). As a result, mark-to-market rules may be ideal for investment banks and trading activities, but are not appropriate for the business model of commercial banks, because the latter are induced to operate with a short-term perspective (de Larosière report, 2009).[18]

Concerning the accounting standards for incurred and expected losses in the loan portfolio, it is argued that these exacerbate procyclicality because incurred losses do not relate to expected losses, i.e. provisions for future losses are not included (Saurina, 2008 and Tumpel-Gugerell, 2010). During recession periods, non-performing loans tend to rise and banks exhibit losses that reduce their capital and their ability to lend. These problems are exacerbated during periods of sharp declines in liquidity.

Finally, concerning the impact of accounting standards on credit standards, the latter are expected to be directly affected by a change in both the regulatory and economic capital of banks (see Section 3 and Enria et al., 2004). Also, credit standards are indirectly affected by an increase in the banks' cost of funding, due to the increased volatility in their financial statements (Barth, 2004). This increased volatility owing to the application of the fair-value accounting method may be interpreted as an indication of increased risk, thus raising the cost of funding (Barth, 2004; Platin et al., 2008b).

[16] The amplification of the current trend in asset prices is examined by Boyer (2007). He refers to the existence of an accounting accelerator, which adds to the financial accelerator and strengthens the existing volatility. The accounting accelerator exists because fair-value accounting mixes information on an asset's cash flow and the market's risk appetite and consequently affects asset valuation.

[17] For example, interest rate derivatives (used to hedge interest rate risk) appear in financial statements using the fair value method, while at the same time the loan portfolio (where the interest rate risk is present) is (usually) calculated on the basis of the historical cost method.

[18] Platin et al. (2008b) conclude that the mark-to-market method is preferable in the case of relatively short-term and junior assets that are traded in highly liquid markets, while historical cost accounting is preferable in the case of senior assets with the opposite characteristics (like the majority of a commercial bank's assets).

4.4.2. Advantages of current accounting standards

The main advantages of current accounting standards are related to the increased transparency of the banks' financial statements. This transparency enhances market discipline and provides timely information to investors and stakeholders about potential financial problems (Vinals, 2008). Therefore, because the banks' financial statements were procyclical, even before the application of fair-value accounting, this method is an ideal choice for financial intermediaries (Novoa et al., 2009). Furthermore, it has been argued that fair-value accounting was neither liable for asset fire-sales nor did it add significantly to the severity of the last global financial crisis (Laux and Leuz, 2009).

Finally, despite the fact that the use of the alternative historical cost accounting in banks' financial statements may be less volatile than fair-value accounting, in the case of a financial asset's price fall, the relevant loss has to be presented in the financial statements, and the result will be similar to that of the fair value method.

5. Mitigating the procyclicality of banking sector

In the preceding analysis, we discussed factors exacerbating the banking sector's procyclicality. In this section we discuss the literature that presents a set of proposals for mitigating the banking sector's procyclicality.

5.1 Proposals concerning the Basel II framework

Proposals to reduce procyclicality attributed to the Basel II framework can be divided into two categories, namely those relating to the general rules for the banking industry (rules or system-wide variables), and those relating to individual banks (discretion or bank-specific variables).[19] There is an ongoing discussion in the literature regarding the positive and the negative aspects of rules and discretion. The best policy to avoid excessive procyclicality in the banking sector appears to involve a trade-off between rules and discretion (Borio and Shin, 2007). In the following discussion, we present the main proposals concerning rules and discretion.

[19] See Caruana (2010). There are also proposals that combine rules and discretion (Repullo and Suarez, 2008).

5.1.1. Using rules to calculate capital requirements and capital buffers

Some studies propose that capital requirements and capital buffers should be based on "built-in stabilizers" for the whole banking system. Built-in stabilizers can help supervisors to take suitable measures if a threat is identified, despite any adverse reaction from the markets (Borio, 2009; IMF, 2009a; Caprio, 2010; Caruana, 2010). As far as the calculation of capital requirements is concerned, the main proposals relate to the proposition of whether capital requirements should change based on the phase of the business cycle.

To avoid the substantial increase in capital requirements in the downturns, Kashyap and Stein (2004) propose the use of different risk-related capital requirements, depending on the phase of the cycle. This proposal can dampen the procyclicality without simultaneously significantly compromising the stability of the banking system. However, this proposal has the potential drawback of moral hazard on the part of supervisors. A related proposal is the smoothing of the minimum capital requirements, using either an autoregressive rule or a countercyclical indexing rule. The suggestion is that this policy will alter Basel II's capital requirements based on an adjustment factor, which is larger than the one in the upward phase of the cycle and less than the one in the downward phase (Gordy and Howells, 2006). Another proposal advocates that procyclicality can be reduced by integrating risk-based deposit insurance with risk-based capital standards (Pennacchi, 2005).

A similar proposition concerns the change in minimum capital requirements based on the average observed ratio of equity to total assets in a country (Gersbach and Hahn, 2010). Note that capital requirements tend to reduce the effectiveness of the monetary policy transmission mechanism through the banking system (Bliss and Kaufman, 2003). During recessions, banks may not be able to utilize the central bank's liquidity mechanism, if they do not have the required capital adequacy (because of the increased probability of default and loss-given default). In this case, there is a need for changing of minimum capital requirements, in order to prevent a credit crunch.

Further, the literature recognizes the inherent need for higher capital requirements to safeguard against interest rate risk. In particular, a recent literature inspired by the use of the VaR estimates for a period of twelve months (BCBS, 2011) and/or the conditional VaR (CoVaR) (Adrian and Brunnermeier, 2008) methodologies, shows that there is a need to increase the capital requirements for market risk in the trading portfolio, complex securitizations and re-securitizations.

There two proposals for the calculation of capital buffers. First, the build-up of capital buffers in the upward phase of the cycle is necessary, which can then be used during the downward phase. This proposal has been supported by the International Monetary Fund (IMF, 2009a), the de Larosière report (2009), the Warwick Commission (2009) and Brunnermeier et al. (2009), and was finally adopted by Basel III. However, some scholars argue that although this proposal is plausible, it should not be used in all countries, as the relationship between the GDP growth and the countercyclical capital buffer can be negative (Repullo and Saurina, 2011). Two macroeconomic indicators are proposed to calculate the banks' capital buffers. The first is the weighted average growth rate of the banks' assets, where the weights are based on the inflation target, the average long-term growth rate of GDP and the ratio of total bank lending to GDP (Goodhart and Persaud, 2008). The second is the deviation between the current and the long-term average GDP growth rate (Repullo et al., 2009).

The second type of capital buffers relates to the creation of a capital conservation range. This is a mandatory capital buffer above the regulatory minimum requirement, which can be used to absorb losses in a crisis. The range of the capital buffer would be built up gradually and calculated as part of the yearly net earnings, reducing the distributable profits (BCBS, 2011).[20]

5.1.2. Using discretion to calculate capital buffers

Another branch of the literature favors the calculation of separate capital buffers for each bank (discretion). There are four main arguments in favor of this. First, the impact of the business cycle on the banks' financial statements is related to the quality of their assets (ECB, 2009b). Banks with lower quality assets exhibit higher probability of default in the downturns, which, among other things, should be considered when calculating their capital buffers (Marcucci and Quagliariello, 2009). Second, many banks maintain significantly higher regulatory capital levels than those prescribed by Basel II (Gordy and Howells, 2006 and Jokipii and Milne, 2008). Third, there is heterogeneity in the risk diversification of banks' portfolios when capital adequacy rules are altered, due to characteristics of individual bank and banking sectors as well as the macroeconomic conditions in each country (Delis et al., 2012). Fourth, it is noted that discretion makes it difficult for the supervisory authorities to evaluate the size of the capital buffer and the banking sector's procyclicality may not be

[20] Distributable profits include dividends, share repurchases, discretionary payments on Tier I capital instruments and bonuses to employees (non-distributed profits are included in Tier I capital).

significantly attenuated (ECB, 2009b). Therefore, it is suggested that individual countries can use some degree of discretion, when defining the size of the capital buffer.

The main proposals concerning the calculation of each bank's capital buffer relate to the following: (i) each bank's contribution to the overall systemic risk (Acharaya et al., 2009; Adrian and Brunnermeier, 2008); (ii) the bank's credit growth and leverage ratio compared with the industry average, and the maturity mismatch of assets and liabilities (Brunnermeier et al., 2009; Persaud, 2008b); (iii) the use of the average and/or the highest average estimate for the bank's probability of default, separately for each exposure class (BCBS, 2011; Caprio, 2010), and (iv) for capital-constrained banks, enhanced regulatory supervision (Pillar 2) and increased disclosure (Pillar 3) will need to make the buffer stock of capital positively related to the business cycle in order for procyclicality to be reduced (Jacques, 2010).

The first step towards employing discretion has already been taken, in the form of extra capital requirements for systemically important banks. Also, discretion and rules can be combined in the case of banks with larger shares of credit supply. However, there is also some skepticism about the wide use of discretion. Common monetary policy across European countries, as well as matters concerning the efficiency of the banking system and the ability of policy makers to make comparisons across banks, may be hampered by using different rules for each individual institution, or even for each country.

5.1.3. Basel III and its implications

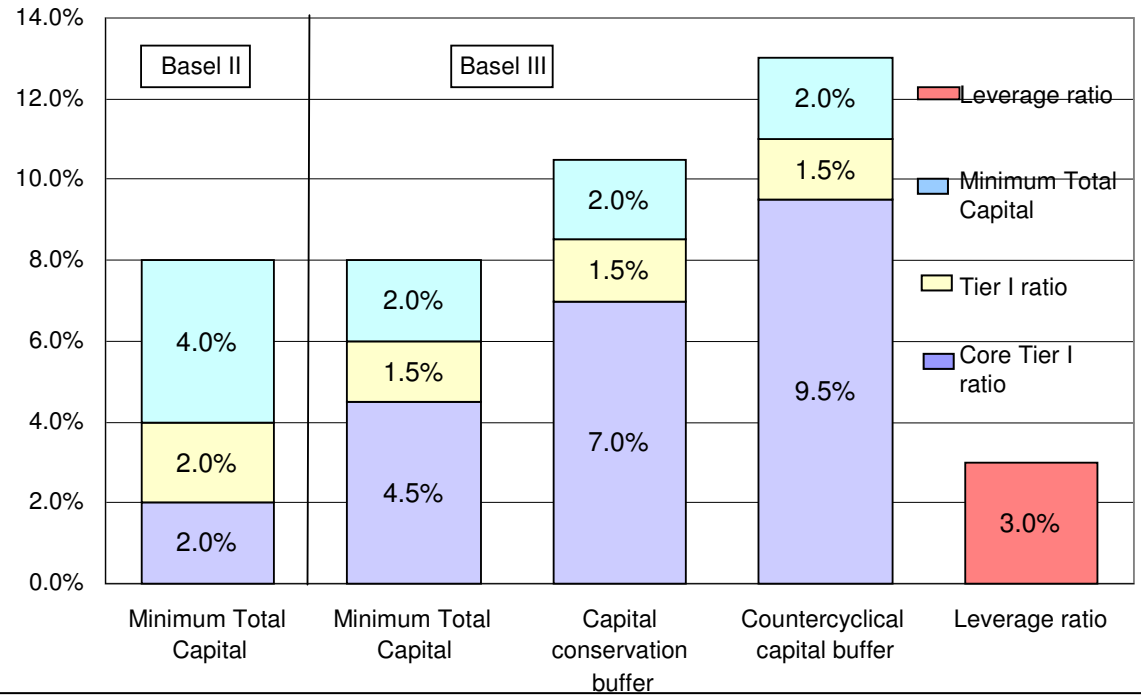
In September 2010, the BCBS announced its final decisions, known as Basel III, on a series of amendments to the Basel II framework, to improve the quality and quantity of banks' capital, enhance liquidity, reduce bank's tendency to take high risks and dampen procyclicality (BCBS, 2010a).[21] In July 2011, the EU adopted two new directives: the Capital Requirements Directive IV and the Capital Requirements Regulation. This legislative package will transpose the Basel III Accord into EU law. The proposals of the new framework will be implemented gradually from 2013 until 2019. However, banks can make the necessary adjustments in advance (BCBS, 2010a). Here, we outline the main propositions of the Basel III framework concerning the issues directly related with procyclicality. With regards to capital, the Commission decided: First, to raise the core Tier I Ratio from 2% to 4.5% (Figure

[21] The final document of Basel III was published in December 2011 (BCBS, 2011) and has only a few changes from the July 2010 agreement among the 26 (out of 27) members of the Basel Committee. The main difference is the longer transition period (different for each proposal) for full implementation of the new capital rules, which may be due to the finding that a longer transition period is likely to have less impact on the GDP and loan supply (Macroeconomic Assessment Group, 2010).

1); second, to increase the minimum Tier I capital from 4% to 6%; and third, to impose stricter criteria on which financial instruments can be included in the Tier I capital requirement.

Figure 1

Capital adequacy ratios, capital buffers and leverage



Notes: - Tier I ratio includes Core Tier I ratio.
- Minimum Total Capital includes Core Tier I ratio.

As regards the leverage ratio, it is proposed to use a minimum Tier I leverage ratio of 3% (non-risk-based) during the parallel run period, until the full implementation of Basel III on January 1, 2018. Further, the Committee decided to increase the capital requirements for the banking and the trading portfolio and counterparty credit risk, while efforts are being made to reduce dependence on credit-rating agencies for determining capital requirements for credit risk.

Regarding liquidity, the Basel Committee decided to establish two main liquidity ratios, namely the liquidity coverage ratio and the net stable funding ratio. The former ratio is designed to ensure that a bank is able to meet the cash outflows during a crisis for 30 days, while the latter will function as an additional long-term liquidity ratio with a one-year time horizon. The Committee also decided to change the definitions of liquid assets, which are to be used to calculate these ratios (2010b). However, the clarification of liquidity and leverage ratios, as well as the additional funds required by systemically important financial institutions, is pending.

To address systemic risk, the Committee is moving towards a higher loss absorbing capacity (i.e., higher capital adequacy ratios) for systemically important financial institutions. This naturally relates to procyclicality, for which the Committee reached several decisions, with four main targets: (i) introducing a number of safeguards such as a longer period for calculating probability of default, downward loss-given default to mitigate the procyclicality of minimum capital requirements, and basing their calculation on factors that cover the entire economic cycle; (ii) supporting the proposals of the International Accounting Standards Board (IASB) to promote dynamic provisioning; (iii) introducing the capital conservation buffer, to be ultimately calibrated at 2.5% (Figure 1), and maintained by banks throughout the economic cycle, aiming to absorb losses on a major crisis; and (iv) introducing the countercyclical buffer, to be determined by national supervisory authorities, depending on the prevailing macroeconomic conditions (strong credit expansion) and which can be calibrated within the 0-2.5% range irrespective of the capital conservation buffer.

In keeping with the discussion in Section 5.1.1, the objective of the countercyclical buffer is to ensure the ability of the whole banking sector to provide loans to the economy during recessions (BCBS, 2010a) and to protect banks from taking significant risks during periods of excessive credit growth. The implementation of this buffer requires the selection of those factors (leading indicators) that will point to the large accumulation of risks, the timing of the changes and the degree of intensity with which this buffer should be used.[22] The supervisory authorities of each country will make the decision to implement the countercyclical buffer, based on the deviation of the ratio of the bank loans to the country's GDP from its trend (BCBS, 2011; Drehmann, 2010). This deviation is the basic reference point[23], but other factors such as asset prices, yield spreads, credit default swaps, survey studies, the phase of the economic cycle, and the possibility of misleading signals may supplement it. Banks will build the capital conservation buffer and the countercyclical buffer through retained earnings (BCBS, 2011; 2010c), which are high quality capital (Core Tier I). Any bank failing to build these buffers will not be affected in its operation (in fact these buffers will be used in crises times), although the bank will not be allowed to distribute profits as dividends, engage in share buybacks, or make discretionary payments to its staff. Repullo

[22] To determine the proper timing for the use of the countercyclical capital buffer, the use of indicators relating to the overall losses of the banking industry in conjunction with the indicators of the lending standards is proposed.

[23] The above deviation seems to be inappropriate as a reference point for countercyclical buffer in many countries (Repullo and Saurina, 2011 for France, Germany, Italy, Japan, Spain, the UK and the USA; Athanasoglou and Daniilidis, 2011 for Greece) and can lead to adverse results, because credit growth lags the economic cycle and because of the development of innovative financial products.

and Suarez (2013) state that, for high values of social costs of bank failure, Basel III points in the right direction, with higher but less cyclically-varying capital requirements

5.2. Proposals concerning leverage, funding and market liquidity

Addressing procyclicality arising from the combination of leverage and funding liquidity is difficult because of their mutual interaction. Here we present the main proposals aiming at smoothing the procyclicality from this source.

The first is the use of a maximum leverage ratio for each bank.[24] There are four main advantages of using this ratio. First, the riskiness of assets is not taken into account and, therefore, the ratio is not affected by the pricing of risk over the economic cycle. Second, the banks' capital structures are determined based on specific cross-sectional determinants, which are similar to those of the non-financial business sector, except for banks with marginal capital adequacy ratios (Gropp and Heider, 2009). This is in conjunction with the fact that the U.S. banks appear to actively manage their leverage ratio (Berger et al., 2008). Third, this ratio is simple and increases transparency (Blum, 2008). Fourth, the leverage ratio is related to the bank's viability in extreme circumstances as it is indicated by the Joint Financial Stability Forum - Committee on the Global Financial System Working Group (Joint FSF-CGFS Working Group, 2009).

However, the use of this ratio has some disadvantages. First, the basic leverage ratio can be viewed as rather restrictive, especially in the case of banks taking hedging positions. Second, it may lead banks to take increased risks in search for yield. Third, it may lead to a deleveraging process during the downturn phase of the economic cycle (IMF, 2009b). An alternative proposal concerning leverage is to increase the margin requirements on OTC derivatives, along with the imposition of minimum haircuts for securities financing transactions (Joint FSF-CGFS Working Group, 2009).

The main proposals concerning liquidity include the following (Joint FSF-CGFS Working Group, 2009): a) The promotion of through-the-cycle measures of market risk. Moreover, valuation reserves could be held in the case of weak data or modeling supporting the valuation. b) The imposition of stress tests for new risks or new financial products. c) improving methods to estimate the funding liquidity risk, by covering all the phases of the economic cycle. d) The restricted use of the contractual trigger (i.e. provisions in a contract

[24] The leverage ratio is equal to the ratio of total assets (which includes off-balance sheet assets) to the bank's equity (book value - Committee on the Global Financial System, 2009). A maximum leverage ratio will be compulsory from January 1, 2018.

that give a creditor extra protection if conditions deteriorate beyond a pre-determined threshold).

A final suggestion concerning banking regulation is about changes to the objectives of supervision. In recent years, securitization was at the heart of banks' risk-management activities. Within this process, banks changed from organizations managing credit risk (in which they traditionally specialize) to organizations managing market risk and liquidity. A supervisory body that focuses on the ability of financial sector firms to manage the risks they have undertaken in conjunction with the application of some methods to calculate counter-cyclical capital requirements, may lead to an more stable financial system overall, where the need for supervisory authorities' intervention will be rarer (Persaud, 2008b).

5.3. Proposals concerning accounting rules

To address procyclicality attributed to accounting rules, the literature proposes at least three changes in the existing accounting methodologies. The first is the implementation of dynamic provisioning and through-the-cycle provisioning.[25] Dynamic provisioning generates a fund during the upward phase of the cycle, which covers the losses incurred in the downward phase of the cycle, without affecting net earnings. This happens to both the IFRS and to the US GAAP. Both address provisions in the same manner, but differ significantly in the way they are applied in various countries, which is due to tax and historical reasons, as well as the way supervision is exercised (FSF, 2009a). However, their effectiveness depends on the country-specific features of the banking system and overall business practices (Chan-Lau, 2012). For maximum effectiveness, dynamic provisions should be tax deductible and presented in the financial statements (Andritzky et al., 2009) and should be used not only in the loan portfolio, but also in the trading portfolio (Landau, 2009b). The drawback of this strategy is that it will inevitably compromise investors' information about the company's current financial situation (IMF, 2008).

The second proposition is the replacement of IFRS 39 with IFRS 9 (International Accounting Standards Board, 2010) rules, to reduce complexity (Grant Thornton, 2009). The

[25] Through-the-cycle provisioning refers to provisions made based on the expected loss-given default of a loan throughout its duration. Dynamic (or statistical) provisioning is an extension of through-the-cycle provisioning and is calculated using time series on probability of default (Novoa et al. 2009). Dynamic forecasts have been applied in Spain since 2000, Colombia since 2008 and experimentally in Peru, recently. Their calculation is based on the weighted average of general and specific provisions. Note, that while dynamic provisioning has proved useful in the current crisis, they are not a panacea. This is because there is no guarantee that they will be sufficient in a major crisis, and that they cover only a bank's loan portfolio and not its trading book (Saurina, 2009; Brunnermeier et al., 2009).

process to replace IFRS 39 with IFRS 9 has been completed by the International Accounting Standards Board. The reduction in complexity results from the classification of financial assets either in amortized cost or in fair-value accounting, depending on the bank's business model and each financial asset's cash flow characteristics. The proposed date for full implementation of IFRS 9 was January 1, 2013. The differences between IFRS 39 and IFRS relate to: (i) the application of fair-value accounting in financial statements, with an emphasis on the changes in the value of the debt and the effect of these changes on the net earnings; (ii) the recognition of losses in the banking and the loan portfolio; and (iii) hedge accounting. The International Accounting Standards Board has proposed an alternative method to dynamic provisioning for losses in the portfolio, namely the Expected Cash Flow Model, according to which provisions are formed on the basis of expected losses in the bank's loan and banking portfolio, and a real discount rate is estimated. The European Commission considered, however, that dynamic provisions, thus generated, would be quite insufficient, although the contribution of this method to dampening procyclicality has been recognized (Bank of Greece, 2010). It should be noted that this proposal would complement, not replace, other proposals that provide a safety net against events of systemic importance.

The third suggestion is the use of transparent qualitative and quantitative notes. These notes should supplement the valuation of financial assets when using mark-to-model valuation, and consider the current phase of the economic cycle and the existence of outliers (IMF, 2008, 2009a, 2009b). Allen and Carletti (2008) suggest that fair-value accounting should be supplemented by mark-to-model as well as historic cost valuations, in the case of a financial crisis accompanied by market illiquidity.

Other suggestions of lesser importance consider the use of assessments made by specialized companies, as well as the accounting treatment of financial assets depending on whether they are financed with short-or long-term capital. For more on these issues, please refer to IMF (2008; 2009a; 2009b) and (Persaud, 2008b), respectively.

5.4. Other proposals

This final sub-section on the proposals to mitigate procyclicality of the banking sector, points to two important arguments concerning the insurance of capital and the issuance of convertible bonds.

Concerning the former, it has been suggested that in the event that a bank's capital adequacy ratio falls below a threshold, the bank should be able to receive an amount of money large enough to restore it from private insurance companies (Kashyap et al., 2008; Repullo

and Suarez, 2008). The same literature recognizes that such a policy involves advantages and drawbacks. First, the premium paid in insuring a systemic event may be substantially smaller than the cost of raising addional capital. Second, in terms of absorbing the impact of a systemic risk on the economy, this proposal is just as effective as higher capital requirements. Third, since capital insurance can mitigate the underlying frictions (the governance and the internal agency problems) that make bank equity expensive, can also reduce externalities associated with bank distress while at the same time minimize the potential cost of public bailouts during crisis. The literature considers as drawback the issue of dealing with a failing insurance company in case a number of large banks experience losses at the same time.

Regarding convertible bonds, the relevant proposals include: (a) the issuance of bonds that will be automatically converted into ordinary shares (reverse convertible debentures), when the market's assessment for a bank's capital to assets ratio falls below a threshold (Flannery, 2005); and (b) the mandatory issuance of convertible bonds (at a predetermined price) by banks deemed too big to fail (Vermaelen and Wolf, 2009). The difference between this proposal and other similar proposals is that the existing shareholders are offered the opportunity to buy these shares, so as not to transfer wealth from current shareholders to bondholders, while the interest rate on these bonds would be lower than those of common bonds.

6. Conclusions

Procyclicality is an inherent feature of the banking sector and its generation process can be found in deviations from the efficient market hypothesis. Banks fail to properly perform their role as mechanisms for allocating resources efficiently within the economy, while the viability of individual banks and, thus, financial stability is hampered.

This study separates the causes of procyclicality from the factors that can attenuate or intensify it. These factors include the monetary policy, the regulatory and supervisory framework, the practices of financial firms, such as leverage and remuneration policies, and some other factors such as credit rating agencies reports, etc.

The recent global financial crisis and the new decisions forwarded by the Basel Committee confirm that the banking industry's procyclicality is now in the limelight, as it exacerbates the current phase of the economic cycle through a process of mutual reinforcement. The channels highlighted in this review article have direct consequences on both the real economy and financial stability. Before the current crisis, but especially after its ignition, a series of proposals to dampen the banking sector's tendency to procyclicality were

presented. For convenience we divided these proposals into those relating to general rules for the whole banking industry (rules) and those related to individual banks or countries (discretion). Some of these proposals have been adopted in the new Basel III framework, in an effort to address the procyclicality issue.

Our review shows that the criticism about the role of Basel II to amplify procyclicality in the banking sector is well founded, despite the fact that not all of its recommendations were followed by 2007. However, it may be the case that this criticism underestimates, to a large extent, the contribution of this framework toward the direction of effective risk management in the banking sector and its role in financial stability, although on the latter some authors support an opposite, or at best an ambivalent conclusion. Also, we show that accounting rules can cause increased variability in banks' financial statements and delay the recognition of losses in loan portfolios, leading to an exacerbation of procyclicality. It should be noted that banks themselves defaulting during a crisis due to bad manegment policies and/or unwise trading strategies, can cause a far greater negative effect on the economy than the reduction in credit caused by increased capital requirements.

Overall, even though there is some consensus on the causes and effects of procyclicality, little progress has been made in finding ways to mitigate it and in explaining the reasons why in some countries credit systems are more procyclical than in others. In any case, the measures taken to mitigate procyclicality should be optimal in the sense that they should achieve the maximum benefit for real economic activity and financial stability with the minimum economic and social cost.

One important conclusion of our review is that the literature attempts to examine the determinants of banks' procyclical behavior mainly from the supply side. However, further analysis is warranted to determine the impact of the demand side, especially in times of economic crises. Further, although some theoretical studies suggest that Basel II does not exacerbate procyclicality, the majority of the empirical literature agrees that it does amplify procyclicality. More research is required to bridge this gap.

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