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Basel III and Credit Crunch: An Empirical Test with Focus on Europe

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Abstract

The aim of this research is to show that unless the lending business is incentivised by an appreciable earnings potential the effect of the enforcement of the Basel III capital and liquidity requirements is sure to be a credit crunch. Initially, this empirical research hypothesis was tested against a number of independent variables reflecting trends in lending volumes; subsequently, these variables were used to establish if the risks of default that corporate borrowers face under the impact of credit rationing are likely to be heightened by other factors. The research sample is a set of 2,964 banks operating in Europe in 2014. The values used to construct the variables were taken from the Bankscope (Bureau Van Dijk) and Datastream (Thomson Reuters) databases and from the end-2014 actuals of these banks. Based on their test results, the authors conclude that the need to comply with the newly-enforced Basel III requirements is responsible for a fall in aggregate bank lending and the prioritisation of forms of investment other than the lending business (for example, financial market transactions).

JEL classification numbers: G21, G28
Keywords: Basel III, Credit crunch, Capital requirement, Liquidity requirement, Value at risk, Operational risk.

1 Introduction

The Basel III Accord was launched as an emergency response to undercapitalisation and the downward trend in bank liquidity recorded in the aftermath of the 2007 crisis. The Basel III rules were designed to streamline a number of Basel II arrangements that had proved unsuited to deal with the new economic scenario that had emerged in 2007.
Compared to Basel II, the Basel III Accord framework introduced:

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1) higher regulatory ratios expected to enhance capital quality;
2) a counter-cyclical buffer to prevent bank risks from escalating during expansionary phases of the macroeconomic cycle;
3) a leverage ratio which takes account of off-balance sheet items;
4) ratios to measure short-term liquidity (Liquidity Cover Ratio) and long-term liquidity (Net Stable Funding Ratio).

Due to these measures, specifically the capital and liquidity requirements, banks will be obliged to handle risk-return trade-offs with utmost care and will have difficulty operating at a profit in the lending sector. This means they can hardly be expected to shape business policies with a preferential focus on lending to businesses.

On closer analysis, it is possible to argue that the Basel III Accord was launched for the sole purpose of ensuring financial stability and adequate bank liquidity levels and that the idea of inducing banks to prioritise the lending business as a means of boosting bottom line results did not enter its estimate of potential advantages.

The aim of this study is to offer evidence in support of the empirical research hypothesis that unless lending is incentivised by prospects of adequate returns the effect of the Basel III capital and liquidity requirements is sure to be a credit crunch.

This paper falls into five sections and an Introduction. Section 2 starts with a review of the literature analysing the effects of the Basel II Accord and the expected impact of the Basel III requirements on the lending business and states the resulting research hypotheses; Section 3 offers a description of the materials and methods adopted; Section 4 reports the research findings obtained and Section 5 states the discussion and conclusion.

2 Literature Review

The earliest concerns about the potential adverse effects of regulation on the access of SMEs to credit date back to the enforcement of the first Basel Accord and gave rise to a long-drawn-out divisive debate. In addition to analyses of the Basel III capital requirements and their potential impact on credit supply, the Basel literature includes in-depth studies of the impact of the Basel II requirements on credit volatility, i.e. those fluctuations in credit volumes that the liquidity buffers (countercyclical capital buffers) envisaged under the Basel III framework are intended to correct. In this connection, some authors have gone so far as to predict that the adverse impact of the new capital requirements on the lending business will even be heightened by the liquidity indicators fixed in the Basel III framework.

It is worth mentioning that the Basel II Accord also was severely criticised for an assumed adverse effect on credit allocation.

A tentative assessment of the macroeconomic impact of the Basel II framework on lending volumes is developed in Tanaka [22], where the author argued that its stringent standards and requirements (rating methods) were likely to generate a downward trend in credit supply to certain categories of borrowers, including SMEs, notwithstanding the provision of measures designed to control banking risks [18]. In addition to this Tanaka [22], predicted that the Basel II rules would spark off a sharp rise in the pro-cyclical fluctuations of the economic cycle.

In overall terms, the Basel literature is rather cynical about the ability of the Basel III requirements to correct the principal shortcomings of the Basel II framework or

effectively reduce the growing illiquidity and pro-cyclicality levels recorded within the banking system.

In the opinion of Spinassou [20], there were signs that the new capital requirements would cramp credit supply without generating an appreciable improvement in macroeconomic stability.

In a study of the potential impact of the new Basel III capital requirements on credit growth, Cosimano and Hakura [8] concluded that excessively stringent capital requirements would cause loan rationing and, by slowing down the rates of global economic growth, unleash a dangerous domino effect resulting in further damage to the financial sector as a whole.

In Francis and Osborne's [10] analysis of the impact of the new Basel III framework on the financial and macroeconomic sectors the main benefit expected from the higher capital requirements, i.e. financial stability, was set against an assumed adverse effect such as reduced bank credit supply. Based on a simulation of the impact of the countercyclical capital buffer, these authors suggested that the effect of the Accord might be to scale down both aggregate loans and total risk-weighted assets (RWA).

The research focus of Slovik and Cournede [19] is the higher lending spreads that banks could be expected to apply in response to more stringent capital requirements. Specifically, they argued that the Basel III requirements scheduled for enforcement in 2015 would drive up lending spreads by some 15 basis points, while those effective from 2019 were likely to have an even greater impact, in terms of inducing banks to increase their lending rates by some 50 basis points on average.

Conversely, Drehmann and Gambacorta [9] strove to provide evidence in support of the claim that the introduction of the countercyclical buffer would help control credit growth during expansionary phases and attenuate credit rationing in situations of economic slowdown. Accordingly, they described the Basel III scheme as a tool to reduce the high pro-cyclicality levels caused by the Basel II Accord [4].

In the estimation of Martin Ceron [17], there are signs that the Basel III liquidity buffers will induce credit institutions to accumulate capital until the targeted levels are attained.

Gorton and Winton [11] have performed a comparative analysis of the effects of the Basel II requirements versus the even more stringent ones introduced by the Basel III Accord. Their findings indicate that the declared purpose of the new framework, i.e. combating bank failures, averting the resulting costs/losses to investors and raising bank stability, are unlikely to be achieved.

In sum, without denying major positive implications of the Basel III reform for the banking industry, most of the authors quoted emphasise the risk that the higher capital thresholds resulting from its stringent capital requirements may generate a dramatic fall in credit supply. Specifically, they predict that small and medium-size enterprises (SMEs) will find it more difficult to gain access to funding and that the new capital rules will scale up bank intermediation fees.

Some analysts maintain that the assumed impact of the stringent Basel III capital requirements and indicators will be passed on from banks to their customers (in terms of reduced credit supply and rising interest spreads). Indeed, they hold that the banking system will be obliged to scale up its stocks of high quality liquid asset (HQLA) not only in an effort to meet the Basel III requirements, but also with the aim of addressing inevitable escalations in costs [1]. Similarly, Hyun and Rhee [12] argue that exacerbated solidity and liquidity requirements, combining with stringent control on banks, might be a prelude to a credit crunch [13]. This is why they recommend a prudential and, most

importantly, stepwise introduction of the new requirements.

The focus point of Jiménez et al. [14] is the impact of the countercyclical capital buffer introduced within the framework of the Basel III Accord. Their analysis is designed to validate the assumption that the buffer will effectively further the achievement of the aim underlying its enforcement, i.e. reducing credit supply during positive cycles and raising it during down cycles. According to these authors, the introduction of the countercyclical capital buffer is likely to discourage the adoption of pro-cycle business policies within the banking sector.

In their 2011 analysis of the impact of the Liquidity Coverage Ratio (LCR) on credit supply, Cornett et al. [7] provide evidence that banks with a solid stock of liquid assets continued to operate at roughly the same pace as before, while those without such a solid stock scaled down their lending volumes. And as Cornett et al. [7] look on a sufficient stock of liquid assets as the precondition for keeping a banking concern going, they claim that the new liquidity requirements will cramp the badly needed growth in credit supply since an adequate stock of liquid resources will be perceived as the prerequisite for outliving a financial crisis. For this reason, they predict an adverse impact of the LCR on credit supply.

Due to the finding that banks facing the severest liquidity risks scaled down their lending volumes despite an increase in their holdings of liquid assets, Strahan [21] argues that the implementation of the LCR is likely to accelerate both these trends.

Van den End [23] has conducted a Monte Carlo simulation of liquidity shocks in order to appraise the impact of the liquidity rules. His findings show that the Basel III liquidity indicators will, admittedly, reduce liquidity risk exposure (by inducing banks to scale up high quality liquid assets holdings), but are probable to generate an adverse impact on credit supply overall and, specifically, a considerable drop in long-term loans.

King [16] highlights that lending spreads soar in direct proportion to rises in the minimum regulatory ratios. His analysis of the impact of the net stable funding ratio on lending spreads demonstrates that the need to meet the liquidity requirements associated with the Net Stable Funding Ratio is likely to induce banks to adopt higher lending spreads. Faced with the need to meet the NSFR requirements, he argues, banks may either opt for reduced year-end earnings or adjust the composition and maturity dates of their loan portfolios. The cost of these strategies for the global economy, he concludes, would be a substantial rise in lending rates [15].

Berger and Udell [3] emphasise the importance of *relationship lending*, a practice based on long-term relationships between lenders and corporate borrowers. In their opinion this practice eases lending operations by helping banks address opacity problems, i.e. the main obstacle to the provision of bank credit. From their perspective, the advantages associated with *relationship lending* stem from loan performance monitoring, a major tool enabling banks to screen firms, especially SME's, for creditworthiness (and, consequently, appraise loan default probability levels) [2]. In short, long-lasting bank-borrower relationships are a major factor enabling a bank to monitor a firm's (and especially an SME's) record of performance on past loans and, consequently, obtain all such soft information as may lead to the decision to authorise a loan [5] [6].

In the light of the theoretical *excursus* reported above, the authors resolved to conduct their empirical analysis by proceeding in two directions: on the one hand, to identify the independent variables reflecting trends in aggregate lending and, on the other, to use these variables in order to establish which factors have the greatest adverse impact on aggregate lending.

Accordingly, the research hypotheses were formalised as follows:
HP.1 *The new Basel III liquidity requirements are likely to lead to a credit crunch*
HP.2 *The higher capital quality requirements enforced under the Basel III scheme are likely to lead to a credit crunch*
HP.3 *The impact of default risks (PD) is likely to exceed both the effects of market risks and those of operational risks.*

HP1	HP2	HP3
NSFR & LCR may lead to a credit crunch	Capital Req. & Leverage may lead to a credit crunch	PD may have a stronger impact than VAR & Oper. Risk

3 Materials and Methods

The research sample consists of 2,964 listed and unlisted banks operating in Europe in 2014. The values used to construct the variables were taken from the Bankscope (Bureau Van Dijk) and Datastream (Thomson Reuters) databases and from the annual reports of the sample banks.
Before running a linear regression analysis to validate their research hypotheses, the authors tried to establish if there were any significant correlations between the variables constructed based on the responses of their interviewees.
Specifically, with respect to the first research question they determined the statistical significance of the following model:

$$Y\ [Aggregate\ loans] = \alpha + \beta_1\ NSFR + \beta_2\ LCR + \beta_3\ capital\ requirement + \beta_4 leverage + \beta_5\ PD + \beta_6\ dimension + \beta_7\ VAR + \beta_8\ operational\ risk + \varepsilon \quad (1)$$

where:
Aggregate loans = the total lending of a bank, expressed as a percentage of its total assets (Y_1);
NSFR = Net Stable Funding Ratio. The NSFR is one of the measures that the Basel Committee expects to increase resilience within the banking sector. The NSFR is defined as the ratio of a bank's available amount of stable funding to the corresponding required amount and is expected not to fall below 100% (on an ongoing basis). The relevant values were calculated based on the above-mentioned balance sheet data of the sample banks;
LCR = Liquidity Cover Ratio. The rationale underlying the enforcement of the LCR by the Committee is the need to ensure short-term resilience by requiring banks to hold high quality liquid assets (HQLAs) in amounts sufficient to enable them to survive a 30 calendar day period of extended stress. The LCR is defined as the ratio of a bank's stock of HQLAs to the aggregate value of the net cash outflows expected over the subsequent 30 calendar day period. The relevant values were determined by reference to the balance sheet data of the sample banks;
Capital ratio = This is defined as the ratio of Total Capital (Tier 1 Capital plus Tier 2 Capital) to the amount of the bank's risk weighted assets;
Leverage = a non-risk-based leverage ratio that takes account of off-balance sheet exposures will serve as a backstop to the risk-based capital requirement. The leverage ratio is defined as the ratio of capital to exposure;

PD = Probability of default. The PD values of the sample banks were determined based on the average probability of default levels of their counterparties;
Dimension = this variable measures the size of a bank as reflected in its total assets;
VAR = Value at risk. This variable is a proxy for market risk. VAR is the maximum potential loss envisaged for a portfolio;
Operational risk = Operational risk is the risk of loss resulting from inadequate internal factors such as processes, personnel and systems or from adverse external events and was calculated in line with the three approaches developed by the Basel Committee (Basic Indicator Approach; Standardised Approach; Advanced Measurement Approach).

4 Results

Preliminarily, it is worth mentioning that the variables of our correlation matrix were found to be normally distributed. And as no fewer than fifteen correlations were found to be significant (see Table 1), it was possible to conclude that the variables under investigation were significantly correlated.

Table 1: Correlation Matrix (Pearson Correlation; N = 2.964)

	Amount of credit	NSFR	LCR	Capital requirement	Leverage	PD	Dimension	VAR	Log_operational risk
Amount of credit	1								
NSFR	-.079**	1							
LCR	-.193**	.051**	1						
Capital requirement	-.793**	.087**	.101**	1					
Leverage	.005	-.023	-.024	.001	1				
PD	-.789**	.088**	.094**	.937**	-.005	1			
Dimension	.009	.022	.009	-.008	-.013	-.014	1		
VAR	-.001	.004	-.014	-.001	-.018	.002	.013	1	
Log_operational risk	.004	.003	-.028	-.018	-.015	-.014	.019	-.015	1
**. Correlation is significant at the 0.01 level (2-tailed).									

The decision to opt for an OLS analysis was made dependent on the results of a number of preliminary tests, namely a Shapiro-Wilk test designed to check the normality of residuals, a Breusch-Pagan test to appraise homoskedasticity, and a VIF and Tolerance test to rule out multicollinearity.
As the results of these tests were also found to be statistically significant, the authors proceeded to the subsequent step, i.e. an OLS analysis intended to establish if there were cause-effect relationships between the variables investigated and, accordingly, validate the research hypotheses (Table 2).

Table 2: OLS analysis

Model	Amount of credit		
	Standardized coefficients		T-statistic
NSFR	-.003		-.306
LCR	-.114**		-10.588
Capital requirement	-.429**		-13.994
Leverage	.001		.080
PD	-.375**		-12.221
Dimension	.002		.182
VAR	-.003		-.238
Log_operational risk	-.012		-1.089
Model summary	R-Square	Adjusted R-Square	
	.659	0.658	
ANOVA	F		
	714,644**		

Sign.level: 1% (**); 5% (*)

The findings of the OLS analysis and the ANOVA test are reported in Table 2. Specifically, the model adopted shows an adjusted R^2 of 65.8%, while the results of the ANOVA test are an F-value of 714,644 and a significance value below 0.01.

As far as the analysis of the regression coefficients is concerned, it was found that credit supply levels are significantly associated with three independent variables, namely LCR, Capital requirement and PD, while all the variables (LCR beta coefficient = -0.114; Capital requirement = -0.429; PD = -0.375) were seen to be negatively correlated with the aggregate loans variable.

Based on the finding that the lending volumes of the sample banks had been adversely affected by only one of the Basel III liquidity requirements, LCR, it was possible to conclude that the relevant variable, aggregate loans, was significantly correlated only with LCR and that hypothesis H_1 was consequently partially confirmed. In addition to this, as LCR is an indicator of short-term liquidity, it was found that the ratio of the HQLA stock to the total net cash outflows of the subsequent 30 calendar day period directly impacts lending volumes.

No such effect was observed with respect to the liquidity requirement for the long-term NSFR level.

An additional finding is that lending volumes were directly impacted by the capital ratio,

but not by the leverage ratio. This means that hypothesis H_2 is partially validated. In all probability, the lending decisions of a bank are only influenced by the former indicator since this is sensitive to the bank's overall risk exposure. In contrast, as leverage is an indicator of asset coverage (and off-balance exposure), it has no influence on the investment decisions made by a bank.

The third research hypothesis, i.e. the assumption that loan rationing is mainly caused by credit exposure, rather than market and operational risks, is validated by the finding that aggregate loans appear to decrease in direct proportion to rises in portfolio risks. The standardized coefficient of PD was found to be the second highest value, in terms of ranking below the capital ratio only. And as this effect was neither observed for the market risk indicator (VAR), nor for the indicator of operational risk, the third hypothesis can be said to have been validated.

5 Discussion and Conclusion

Basel III is a set of reform measures developed by the Basel Committee on Banking Supervision with the aim of strengthening the regulation, supervision and risk management procedures of the banking sector. The ultimate purpose of these measures is to create the assumptions for enabling the banking sector to absorb shocks arising in connection with financial and economic stress, for improving risk management, credit allocation and governance and adding to transparency by obliging banks to make more frequent and exhaustive disclosures.

The research reported in this paper indicates that the Basel III Accord may actually generate a credit crunch. In the light of the finding that the Basel III measures and requirements are negatively correlated with the amount of credit allocated, the authors argue that compliance with the Basel III framework may have a cost, which is equal to the corresponding aggregate fall in credit allocation.

As banks are key agents in the transmission channels of monetary policy and play a paramount role in bringing together liquidity providers and seekers of finance, any regulations designed to govern the banking sector should be fleshed out in such a way as to incentivise credit institutions to prioritise their core business (credit allocation) over alternative forms of investment (financial market transactions).

The authors firmly believe that 'better credit' is not necessarily synonymous with 'less credit'. Their findings indicate that the pressure of the Basel III arrangement has induced credit institutions to scale down the aggregate volume of their credit allocation and to opt for other types of investment (for instance financial market transactions).

An additional conclusion suggested by their analysis is that the need to reduce risk exposure has resulted in divestment in unlisted firms and a surge in investment in government bonds despite declining returns on this type of asset.

The Basel Accord is responsible for this mechanism at least in part, since its stringent requirements lead banks to have regard to past performance, as measured by reference to previous year actuals, in preference to the earning potential of new business projects.

The authors suggest that this state of affairs may altogether preclude the attainment of the Basel III targets. On the one hand, they argue, the effect of a credit crunch might be a dramatic fall in the profits reported by banks (since returns on government bonds come short of the potential gains from intermediation margins); on the other, it might cause adverse selection in credit allocation. And both these tendencies might ultimately

undermine the ability of banks to face financial and economic stress in a long-term perspective.
The overall effect of this situation may be to cramp overall economic growth and undermine the prospects of a successful attainment of the goals of the Quantitative Easing provisions enforced by the European Central Bank over the past two years.
In conclusion, the authors argue that a comparative analysis of the positive effects of the Basel III Accord requirements, specifically the hoped-for greater solidity of the banking system, versus the negative impact anticipated on the expected returns of credit institutions and the real economy, should rank highest on the future research agenda.

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