BASEL III EFFECTS ON SMES' ACCESS TO BANK CREDIT :
AN EMPIRICAL ASSESSMENT

Abstract

This paper investigates Basel III effects on SMEs' access to bank credit. French small firms are studied in an innovative empirical framework matching SMEs' observations with observations from their main bank. After controlling for small firm and bank-specific characteristics in a 3SLS model, we conclude that the new regulation has a negative impact on SMEs' bank funding over the 2008-2014 period. In spite of regulatory relieves, the largest decrease in loan volumes can be faced by very small firms and short term credits. Eventually, Basel III can rebalance bank portfolios towards the best regulatory adjusted risk/return profiles.

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1   Introduction

As a matter of fact, market discipline and internal risk management were unable to properly mitigate bank risk taking (Avery and Berger, 1990, Demirgüc-kunt et al., 2008, Claessens et al., 2010, Griffith-Jones and Ocampo, 2010, Basel Committee on Banking Supervision, 2012, Galindo et al., 2012, Dietrich et al., 2014). Credit institutions' inability to self-regulate leads to major banking and financial crises. Such shocks can spread worldwide through direct and indirect interconnections between banking and financial systems. Actually, the bank capital channel amplifies and transfers financial disturbances to the real economy (Levieuge, 2005; 2015a). As a result, bank financing of the real economy diminishes. This reduction is prone to decrease investment, production and tax revenue, while unemployment and government spending increase. Eventually, a downward spiral can emerge and a recession occur.

In this respect, authorities decided to enforce a new set of regulatory requirements : Basel III (Basel Committee on Banking Supervision, 2011). Basel III Accord aims at promoting a sounder and safer banking system at the micro and macroeconomic level. Improved risk management and governance can also help to create more resilient banks. Accordingly, credit institutions must raise their quantity and quality of equity, implement a regulatory leverage ratio and 2 liquidity ratios (at short and long term). A more stable banking system can reduce the magnitude, frequency and severity of financial crises. Long term growth can be strengthen by those new requirements (Furlong and Keeley, 1989, Dewatripont and Tirole, 1993, Santos, 2000, Basel Committee on Banking Supervision, 2010a, Macroeconomic Assessment Group, 2010). Furthermore, more stringent standards aim at reducing bailout procedures. Stakeholders can be more involved in bank recovery rather than taxpayers. Indeed, banking regulation has 3 main objectives (without being able to reach them simultaneously) : 1-productive efficiency of banks, 2-financial stability and 3-a credible no-bailout promise (Dewatripont, 2014).

Nevertheless, if the new regulatory charges are binding for banks, it can adversely affect credit endowments. Actually, the overall net effect of the Basel III Accord is rather ambiguous. On the one hand, increased capital requirements can rise banks' cost of funding. Hence, bank borrowers can face an increased credit cost and/or a decreased loan volume and maturity (Koehn and Santomero, 1980, Rochet, 1992, Reisen, 2001, Griffith-Jones et al., 2010, Institute of International Finance, 2010). On the other hand, more demanding standards can increase loss absorbing capacity of the banking system and thus tempered real effects of financial shocks (Furlong and Keeley, 1989, Dewatripont and Tirole, 1993, Santos, 2000, Basel Committee on Banking Supervision, 2010a, Macroeconomic Assessment Group, 2010). In a nutshell, regulation seems to involve a trade-off between higher standards strengthening the banking system and its costs constraining credit allocation (Amable et al., 2002). We can also note that the negative effects are prominent in the short run, while the positive aspects of the regulation are long term prospects as they are associated with a lower number of financial crises.

The relatively riskier borrowers can be the most affected by the new regulation and its potential adverse effects on bank lending. Indeed, due to risk weightings in the computation of regulatory requirements (Reisen, 2001, Liebig et al., 2007, Griffith-Jones and Persaud, 2008, Dietsch and Tilloy, 2010, Bonino et al., 2011, Schizas, 2011, OECD, 2012), risky borrowers can experience the most of Basel III negative effects as they request more regulatory capital and liquid assets. Accordingly, a more binding regulation can jeopardise Small and Medium-sized Enterprises' (SMEs) access to bank credit. These borrowers can feel the most the new regulation as a) they are relatively risky and b) rely on banks for their funding (Bernanke and Lown, 1991, Peek and

Rosengren, 1995, Berger and Udell, 2002, European Commission, 2005, Carbo-Valverde et al., 2009, Kremp and Sevestre, 2013, Dietsch and Mahieux, 2014). Such dependency is owed to poor track record, equity, collateral and inappropriate legislative or regulatory environment (Beck et al., 2005, Demirgüc-kunt et al., 2008, Beck et al., 2010, Schizas, 2011, OECD, 2012). The burden associated with higher regulatory requirements can mostly be borne by small firm-type debtors. At the same time, the benefits of a more stable banking system can also be mostly felt by bank-dependant borrowers through a better and secured financing. Whichever effect will dominate has been fiercely debated since the first Basel Accord (Pessarossi and Weill, 2015). Accordingly, it is somewhat surprising that very few quantitative analysis have been conducted on Basel III effects and SMEs' access to bank credit so far. To our knowledge, only the paper by Cardone-Riportella et al. (2011) tackles this particular question, but it mostly considers Basel II impacts. Using computation of regulatory capital requirements, the authors conclude that the Basel Accords enhance bank risk assessments and loss absorbing capacities.[1] They also claim that the regulation burden does not fall on SMEs due to the recognition of collateral that reduces capital charges. Besides, the increased sensitivity of regulatory requirements to the actual small firms' risk level raises risk premium and so, credit costs. Basel III can increase credit risk premium from 0.285% in the best case scenario to 2.466% in the worst-case scenario. Those results consider the use of a Loan Guarantee Association (LGA) and so, collateral by SMEs. Without LGA, SMEs' risk premium rises dramatically, up to 16.216%.

There are also a number of notable quantitative analysis on Basel III and SME funding, including Ambler (2011), Angelkort and Stuwe (2011), Schizas (2011; 2012), OECD (2012). Those papers anticipate a negative effect of the new regulation on small firms by means of higher credit costs, lower volume and shorter maturity, delaying the recovery. To be more specific, Dietsch and Tilloy (2010) find that regulatory requirements are overestimated for French SMEs and therefore regulation reduces their access to bank funding. On average, French SMEs can face a 20% reduction in their bank loans according to Pons and Quatre (2014).

Regarding this somewhat scarce literature, we offer to investigate the quantitative effects of Basel III on SMEs' access to bank loans. We focus on French small firms as France is quite representative of other countries applying the reforms in terms of firms' size and share of the whole enterprises' population (especially Italy, Spain and to some extent Germany). We use the BCBS definition of SMEs : firms with reported sales under €50 million (Basel Committee on Banking Supervision, 2006).

From a stylized point of view, French small firms rely on banks up to half of their total debt (Banque de France, 2013). Hence, Basel III can considerably affect these borrowers as they are 1/3 more risky than large firms (default rate of 3.2% against 2.4% (Ait Yahia et al., 2014)). In 2015, French small firms contracted over €382.7 billion of bank credits with €55.7 billion maturing within one year (Banque de France, 2015). All things considered, bank financing is vital to SMEs (Chatelain and Amable, 2001) as they are *de facto* dependent on credit institutions (Dewatripont, 2014). Beyond reliance on banks, SMEs are a pillar of the French real economy (Levieuge, 2015*b*). Accounting for 99.8% of French firms, the 3.1 million SMEs hire 48.7% of the labour force (Ministère de l'Économie, de l'Industrie et du Numérique, 2015). As small firms are a cornerstone of the real economy, their particular funding features are extensively investigated in the literature, including in France (OECD, 2006; 2007, Rameix and Giami, 2011, Betbèze, 2014, Dietsch and Mahieux, 2014, Kremp and Piot, 2014).

Our article aims at filling the gap in the literature regarding the empirical analysis of Basel III effects on small firms. In most cases, banks' response to a more binding environment is

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analysed through increased interest rate spreads. This leads to tightened credit access conditions especially for the riskiest borrowers, such as small firms (King, 2010, Angelini et al., 2011, Cosimano and Hakura, 2011, Slovik and Cournède, 2011). However, banks have incentives and the ability to avoid transferring the costs of increased standards on their customers (Elliott, 2009, Elliott et al., 2012). Therefore, whatever the binding of the new regulation, an upward trend in credit cost can be imperceptible. Historically, it has been the case for the first and the second Accord. French long term interest rate felt by 53.26% from 9.12% to 4.23% between 1986 and 2008. [2] The same pattern can be observed during and after Basel III completion. So far, the interest rate kept on falling down to 0.89% in 2015. Actual unconventional monetary policies applied *de jure* or *de facto* by almost all leading central banks put a downward pressure on interest rates. Eased refinancing conditions possibly nullify any effect of the new regulation on interest rates for virtually all credit institutions. For that reason and contrarily to the literature using DSGE (see Angelini et al. (2011) for a review, and also Covas and Fujita (2010), Darracq Pariès et al. (2011), Agénor et al. (2013)) and loan-pricing models (Elliott, 2009, Elliott et al., 2012), we apply an empirical strategy to avoid assuming the reaction of credit interest rates to Basel III. It also motivates the investigation of the borrowings' volume. The volume of loan is governed by small firms' investment opportunities and not by SMEs' ability to borrow unlike collateral, loan rates or maturity. More, those latter elements also depend upon the volume of loan and thus are of secondary importance.

Using 3SLS (Three-Stage Least Squares) (Zellner and Theil, 1962), we provide an empirical assessment of Basel III effects on small firms' access to bank credit. We investigate whether the new regulation impacts the volume of SMEs' bank borrowings. In an original empirical framework and dataset, we test the influence of the new standards on French SMEs funded by banks listed in France over the 2008-2014 period. Basel III variables are regressed along with bank-specific characteristics and SME-specific characteristics acting as control variables. The latter variables are common in the literature investigating the determinants of bank credit endowments (Ogawa and Suzuki, 2000, Atanasova and Wilson, 2004, Van Gestel et al., 2005, Altman and Sabato, 2007, Carbo-Valverde et al., 2009, Kremp and Sevestre, 2013). Kremp and Sevestre (2013), Kremp and Piot (2014) and Levieuge (2015a) demonstrate that bank credit in France can be forecasted by firms and banks' features. To compute Basel III variables, we use the cost of capital as in Chatelain and Tiomo (2002), the NSFR's computation of Vazquez and Federico (2015) and the leverage regulatory ratio.

We disentangle the effects of the new requirements according to credit maturities (short term and long term) and borrowers' size (very small firms and large SMEs). Those sub-divisions are designed to account for differentiated regulatory treatments. Indeed, despite the fact that SMEs are individually riskier than their larger counterparts, small firms benefit from regulatory alleviations in terms of capital (Basel Committee on Banking Supervision, 2006) and liquidity charges (Basel Committee on Banking Supervision, 2010b). Such eased requirements are justified by higher diversification opportunities and lower inter-correlations (Dietsch and Petey, 2002; 2004, Altman and Sabato, 2005, Dietsch and Tilloy, 2010, European Banking Authority, 2012). In addition, very small firms experience extra abatements when they are eligible to the "Retail" classification. [3] The same pattern is observed for short term lending (with a residual maturity at less than one year). Using microdata, we match small firm-level observations with observations from their main bank. This original dataset is one contribution of this paper to the literature.

Regarding the period, French banks start to restore their capital and liquidity ratios right after the 2007/2008 crisis due to market pressures. For example, the Tier 1 ratio of French listed

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2. Source : OECD, 2016, authors' own calculation.

3. §231, *Nature of borrowers or low value of individual exposures*, Basel Committee on Banking Supervision (2006).

banks exceed 13.25% since 2008 (while the ratio remains around 8% during years prior to the crisis). We assume that Basel III effects are felt long before its complete implementation, while Basel II was already enforced in France. Actually, banks start their transition to more stringent requirements before the publication of the regulation's final version : in addition to market discipline, a smoother transition reduces the costs induced by higher regulatory standards. Finally, regulation is a permanent, ongoing process made of bargaining between regulators, banks and practitioners. Therefore, the new norms are known from all stakeholders long before their enforcement (see Basel Committee on Banking Supervision (2009), for example).

By way of preview, we conclude that increased capital requirements can result in a reduction of bank loans to SMEs. The regulatory leverage ratio can produce the same negative effect. Our results are more contrasted for the long term liquidity ratio. The overall effect of Basel III appears to be detrimental to SMEs' access to bank credit. Confirming concerns from the literature, the NSFR seems to be the most constraining regulatory requirement for French banks. Finally, very small firms seem to feel the most of the new regulation negative effects, despite of their regulatory alleviations. This paper contributes to the literature in different ways : firstly, we focus on small firms' borrowings. Secondly, we match data from borrowers and lenders. And, last but not least, we provide an empirical assessment of Basel III effects on SMEs.

The remainder of this paper is organised as follows. Section 2 describes the dataset, the model and the variables. Section 3 presents the results. Section 4 provides robustness checks. Section 5 concludes and makes some recommendations.

2 Methodology

2.1 Dataset creation

In order to analyse Basel III effects on SMEs, we match small firm variables from Bureau van Dijk's Diane+ with bank variables from Bureau van Dijk's Bankscope. Therefore, we have yearly information about each French SME and their main bank. This matching is one major breakthrough of this article : with this dataset, we manipulate variables linked to both credit demand and supply.

Regarding search strategy, the final panel includes active French firms with positive total borrowings and displaying the name of their main bank. Firms present a net turnover lower than €50 million, which is BCBS threshold for inclusion in SME classification. More precisely, the threshold should be on "sales" but French translation uses the turnover ("*chiffre d'affaires*") instead. After being matched, data cover 32 listed active French commercial, savings and cooperative banks. We only keep listed banks in order to compute Basel III variables and to include a satisfactory number of observations for each year. Furthermore, large and sophisticated banks have a comparative advantage in small firms' lending (Frame et al., 2001, Dietsch and Petey, 2002, Petersen, 2004, Repullo and Suarez, 2004, Berger and Frame, 2007, Claessens et al., 2008, Demirgüc-kunt et al., 2008, Beck et al., 2010, de la Torre et al., 2010). This is due to "transaction lending" which use hard information in scoring models. Such procedures reduce transaction and control costs. Finally, the size of large banks' balance sheet allows them to grant more loans to small firms as a result of diversification opportunities. We can also argue that larger banks will be the most affected by the new regulation due to the capital overcharge for global systemically important banks (GSIB) or their international activities, especially in France.

2.2 The 3SLS model

As previously mentioned, articles investigating Basel III effects in an empirical framework are very sparce. Hence, to provide more theoretical background to our estimations, we introduce another strand of the literature. Regarding SMEs' access to bank funding, some articles investigate the empirical determinants of credit rationing. Authors use microeconomic data in a disequilibrium model, solved by maximum likelihood estimations. Such modelling allows to disentangle whether credit rationing is demand or supply driven. Our interest for this literature is motivated by the fact that SMEs are usually considered to be credit constrained (Beck et al., 2006). Although we pursue a different goal, the following articles are close in spirit to ours and provide ground for our control variables and estimation strategy. The seminal paper by Ogawa and Suzuki (2000) proves land to be playing a substantial role as collateral in mitigating borrowing constraints in Japan between 1980 and 1993. Atanasova and Wilson (2004) analyse the effects of monetary transmission mechanisms on SMEs' bank financing in the U.K. over the 1989-1999 period. The authors conclude that firms' assets reduce borrowing constraints. During tight monetary condition periods, banks and firms have diverging trajectories with a reduced supply of credit facing an increased demand. Using two alternative measures (the Lerner Index and the Herfindahl-Hirschmann Index), Carbo-Valverde et al. (2009) test the impact of bank market power in Spain between 1994 and 2002. They find that market power stimulates credit availability. Still, credit rationing is exacerbated by less competitive market. Such opposing views are reconciled by considering banks' contestability, demand elasticity and the production of information. Closer to our subject, Kremp and Sevestre (2013) investigate whether credit rationing in France during the 2004-2010 period was supply or demand driven. They improve the previous literature by allowing small firms to be partially rationed on their new loans. The sample is composed of 205,154 observations gathered from the Banque de France's Fiben individual company database and the financial linkage database. In terms of results, informationally opaque small businesses are more constrained than larger firms. Collateral is still meaningful in credit access, as much as profitability. Cash flows seem to act as substitutes for bank loans. All things considered, the authors demonstrate that French small firms have not been strongly credit rationed despite of more stringent lending standards. Their results are in line with the European Central Bank's Survey on the Access to Finance of small and medium-sized Enterprises (SAFE).

Broadly, the literature underlines that bank credits to SMEs are empirically explained by both firm-specific characteristics and bank-specific characteristics. Most of those variables can also be found in scoring models (Van Gestel et al., 2005, Altman and Sabato, 2007).

Following Petersen and Rajan (1994) and Berger et al. (2014), we consider "firm-specific characteristics" along with "bank-specific characteristics" in an empirical framework. Carbo-Valverde et al. (2009) use the same kind of specification in their "trade credit dependence model". This model measures the firm financing constraint, which is close to our test of Basel III effects on SMEs' loan volume. We add "Basel III variables" to the demand and supply equations as they are both supposed to be impacted by the new regulatory standards. We use a 3SLS model as in Shrieves and Dahl (1992), Jacques and Nigro (1997) and Aggarwal and Jacques (2001). Simultaneous equations approach allows to explicitly disentangle demand variables from supply variables. Moreover, this model accounts for potential endogeneity between explanatory variables. This empirical strategy is one of our contributions to the literature investigating Basel III effects.

The model is therefore the following :

$$Demand_{it} = \beta_0 + \beta_1 Firm - specific\ characteristics_{it} + \beta_2 Basel\ III_{jt} + \varepsilon_1$$
$$Supply_{jt} = \beta_3 + \beta_4 Bank - specific\ characteristics_{jt} + \beta_5 Basel\ III_{jt} + \varepsilon_2 \qquad (1)$$
$$With : Credit_{it} = Demand_{it} = Supply_{jt}$$

Where i refers to the SME, j to the main bank and t to time. "$Credit_{it}$", the volume of SME borrowings, is the dependent variable. "$Firm - specific\ characteristics_{it}$" are the time-variant set of SME explanatory variables. "$Bank - specific\ characteristics_{jt}$" are the time-variant set of bank explanatory variables, and "$Basel\ III_{jt}$" are the time-variant set of regulatory requirements. ε_1 and ε_2 are the terms of error.

The panel includes a total of 17,021 French firms subdivided between very small firms and large SMEs. In this respect, 13,896 firms with borrowings and bank debts strictly lower than €1 million every year are classified as "Retail". The remaining 3,125 firms are categorized as "Corporate". As small firms eligible to the "Retail" class enjoy additional regulatory relieves (Basel Committee on Banking Supervision, 2006), they are supposed to be less affected by a more binding regulation. Regarding the period, our study focuses on the recent behaviour of banks in the aftermath of the 2007/2008 crisis and the early years of the new regulation.

To ease comparisons and reduce correlations, all variables are logged. It also normalizes credit and firms' size. The absolute value is used to preserve observations with an initial negative value. If the initial value is negative, a negative sign is added to the logged variable. Variables are pre-multiplied by 1000 to prevent values between 0 and 1 to become negative when logged. In mathematical terms, variables are transformed using the following formula :

$$Transformed\ variable =$$
$$[ln(1000 * abs(variable)) \mid variable > 0\ ;\ -ln(1000 * abs(variable)) \mid variable < 0] \qquad (2)$$

Specification tests are available upon request. To summarize, unitroot tests are impossible due to gaps in the dataset. Residuals seem abnormal and heteroscedastic. Some auto-correlation also appears to exist. The validity of fixed effect models is confirmed by Hausman (1978)'s test (Wooldridge (2002)'s robust version to heteroscedasticity is unusable).

2.3 Dependent variables

We investigate two dependent variables in compliance with their maturity : short term SME borrowings and long term SME borrowings. As we separate Retail from Corporate SMEs, two explained variables are used to account for their differentiated regulatory treatment. Indeed, regulation considers exposures differently according to their maturity. Credits with a residual maturity lower than one year benefit from regulatory relieves. Liquidity requirements are especially concerned by such abatements (recognition as "Available Stable Funding" for example (Basel Committee on Banking Supervision, 2010*b*)). The two dependent variables are : "Borrowings ST" for short term credits (at less than 1 year at the origin) and "Borrowings LT" for longer term credits (at more than 1 year at the origin). Besides, this cut-off is performed as the reduction of "contractual maturity mismatch" can reduce SMEs' long term funding.

Regarding regulatory abatements, we can assume that short term credits granted to very small firms are less affected by Basel III than long term credits to large SMEs. However, short term loans granted to very small firms offer low returns. Therefore, after having taken into account the introduction of the leverage ratio, banks can rebalance their portfolios towards more profitable exposures to maintain their profitability (Koehn and Santomero, 1980, Kim and Santomero, 1988, Rochet, 1992). Basel III probably results from a trade-off between credit risks, returns

and regulatory requirements.

Summary statistics of the dependent variables are presented in table 1.

TABLE 1 – Dependent variable summary statistics

	Variables	Obs.	Mean	Std. Dev.	Min	Max
Retail	Borrowings ST	97272	29.4914	102.7021	-313.763	13176.83
	Borrowings LT	97272	48.5554	119.543	-126.893	17774.3
Corporate	Borrowings ST	21875	2252.543	53114.69	-2254.185	4147000
	Borrowings LT	21875	2647.219	27077.03	-115.57	1750000

We notice that the average amount of credits received by very small firms is 55 to 77 times lower than the amount received by large SMEs. Differences between minimums and maximums are of the same magnitude.

2.4 Independent variables

2.4.1 Basel III variables

Basel III variables are crucial to our assessment. As a result, we aim at defining variables that properly represent the new set of reforms. So far, Core Tier 1 or liquidity ratios, complying with Basel III requirements, are not published with a sufficient amount of time to be used as explanatory variables. Therefore, we introduce three variables that represent the new requirements : the cost of capital, the NSFR and the regulatory leverage ratio.

The first Basel III variable is the cost of bank capital ("Cost of Capital"). It is designed to encompass all Basel III capital cost related features. More precisely, it stands for the cost of increased quantity and quality of bank equity, additional conservation buffer, countercyclical buffer and capital overcharge for GSIB. On the basis of loan-pricing models, [4] we use the cost of the liability side of banks' balance sheet instead of the asset side's return. We switch from the interest rate, being the credit cost or the return of bank assets, to the cost of bank resources. This new perspective constitutes another contribution to the literature on Basel III which mainly uses the interest rate.

This variable is constructed following Chatelain and Tiomo (2002). Based on the Hayashi's (2000) cost of capital formula [5], the authors investigate the cost of capital for French companies during the nineties. Accordingly, this variable appears to represent accurately French banks' cost of capital. The variable is computed as follows :

$$
Cost\ of\ Capital =
$$
$$
\frac{p_t^l}{p_{st}} \frac{1}{(1-\tau_t)} \left[\left(\frac{D_{jt}}{(D_{jt}+E_{jt})} \right)(1-\tau_t)\left(\frac{I_{jt}}{D_{jt}} \right) + \left(\frac{E_{jt}}{(D_{jt}+E_{jt})} \right)\rho_t + (1-\tau_t)\delta_{st} - \frac{(p_{t+1}^l - p_t^l)}{p_t^l} \right] \tag{3}
$$

With

$$
\rho_t = \frac{[(E_t(V_{j,t+1} - \psi_{j,t+1}) - V_{jt}) + E_t(d_{j,t+1})]}{V_{jt}} \tag{4}
$$

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4. Elliott (2009), Angelini et al. (2011), Slovik and Cournède (2011), Elliott et al. (2012).

5. Hayashi, F. (2000), The cost of capital, q, and the theory of investment, *Econometrics and the Cost of Capital*, Lawrence J. Lau ed., The MIT Press.

p_t^l is the average gross fixed capital formation ($2010 = 100$), p_{st} is the average price deflator gross value added ($2010 = 100$), τ_t is the statutory corporate income tax rate exclusive of surtax, D_{jt} is the bank gross debt (deposits and short term funding, other interest bearing liabilities, other non-interest bearing liabilities, loan loss reserves and other reserves), E_{jt} is the common equity, I_{jt} is the total interest expense, ρ_t is the equilibrium return (supposed to be equal to the nominal return on other risky financial assets), δ_{st} is the constant rate of depreciation (set at 8%), $V_{j,t+1}$ is the bank capitalisation, $\psi_{j,t+1}$ is the value of the new issued shares and $d_{j,t+1}$ are the dividends.

The expected sign depends on the reaction of the cost of capital to an increased equity volume due to more binding regulatory standards. On the one hand, a more demanding capital regulation can increase banks' funding costs as a larger share of equity is needed. An increased cost of capital can result from the loss of Government explicit or implicit guaranties (King, 2010). It can also be due to the fact that marginal cost of equity stock is cheaper than marginal cost of equity flow/raising equity (Myers and Majluf, 1984, Berger et al., 2008, Gropp and Heider, 2010, Kashyap et al., 2010, Cosimano and Hakura, 2011, Cohen and Scatigna, 2014). On the other hand, an increased volume of equity can foster banks' loss absorbing capacities and reduce shareholders' required rate of return. Following a large part of the literature, we consider a decline in the cost of capital (Elliott, 2009, Basel Committee on Banking Supervision, 2010a, Kashyap et al., 2010, Cosimano and Hakura, 2011, Angelini and Gerali, 2012, Elliott et al., 2012). In this respect, banks can rebalance their portfolios towards safer assets and still satisfy their shareholders' required rate of return. In other words, banks are able to maintain their balance sheet inner equilibrium between cost of liabilities and return of assets with less profitable and risky exposures. This is the parallel of Koehn and Santomero (1980), Kim and Santomero (1988) and Rochet (1992)'s conclusions. Hence, the new requirements on banking capital can reduce SMEs' access to credit. An expected positive sign is therefore plausible.

We also compute a variable for the liquidity ratios. More precisely, we use a computation of the long term liquidity ratio ("NSFR") following Vazquez and Federico (2015). The authors use a stylised bank balance sheet from Bankscope to calculate the NSFR. We replicate their work for our data and apply the weights reported in the following table 2 to our panel of banks :

TABLE 2 – NSFR weightings

Assets			Weightings
Total earnings assets	Loans	Total customer loans (mortgages, other mortgage loans, other consumer/retail loans and other loans)	100%
		Reserves for impaired loans/NPLs	
	Other earning assets	Loans and advances to banks	35%
		Derivatives	
		Other securities (trading securities and investment securities)	
		Remaining earning assets	
Fixed assets			100%
Non earning assets	Cash and due from banks		0%
	Goodwill		100%
	Other intangibles		
	Other assets		

Liabilities			Weightings
Deposits and short term funding	Customer deposits	Customer deposits - currents	85%
		Customer deposits - savings	70%
		Customer deposits - term	
	Deposits from banks		0%
	Other deposits and short term borrowings		
Other interest bearing liabilities	Derivatives		100%
	Trading liabilities		
	Long term funding	Total long term funding (senior debt, subordinated borrowing and other funding)	
		Preferred shares and hybrid capital	
Other (non-interest bearing)			
Loan loss reserves			
Other reserves			
Equity			

Source : Vazquez and Federico (2015)

Excessive maturity transformation is pointed out to be one explanation of the 2007/2008 financial crisis. So, the long term liquidity ratio is designed to "curtail maturity mismatch". More, Hong et al. (2014) proves NSFR to be negatively correlated with bank failure. In this regard, if the NSFR increases, so does its opportunity cost as bank returns go down. Thus, a surge in liquidity cost can restrain credit allocation, translated by an observed negative sign. In the specific case of SMEs, as they enjoy regulatory relieves, an increased liquidity cost can divert bank assets towards small firms. Hence, a positive sign can also be observed in our regressions. Consequently, the expected sign is equivocal for the NSFR.

The last Basel III variable is the regulatory leverage ratio ("Regulatory Leverage" = Equity/(Total assets)). Enforcement of a non-risk based leverage ratio, acting as a back-stop measure, is one major innovation of Basel III. Set at a minimum of 3% of equity, the leverage ratio is designed to reduce bank risk-taking. Hence, it can adversely affect small firms' access to bank credit, reflected by a negative sign. As Blundell-Wignall and Atkinson (2010) estimate, this ratio can be the real constrain of the new reforms.

Table 3 presents some features of the Basel III variables.

TABLE 3 – Basel III variable summary statistics

	Variables	Obs.	Mean	Std. Dev.	Min	Max
Retail	Cost of Capital	78676	13.545	43.2055	-16.7079	318.743
	NSFR	96670	1.6214	.5206	.5287	3.3564
	Regulatory Leverage	96670	.0632	.0346	.0282	.1586
Corporate	Cost of Capital	17808	8.1423	35.0685	-16.7079	318.743
	NSFR	21747	1.5333	.4674	.5287	3.3564
	Regulatory Leverage	21747	.0566	.0303	.0282	.1586

According to the summary statistics, the cost of capital for Retail borrowers' lending is twice as large as Corporate borrowers' lending. It means that lending to very small firms is more expensive for banks in terms of capital than lending to larger companies. Regarding the NSFR and the leverage ratio, means are close for Retail and Corporate SMEs.

2.4.2 Firm-specific characteristics

The "firm-specific characteristics" are common variables in disequilibrium (Atanasova and Wilson, 2004, Carbo-Valverde et al., 2009, Kremp and Sevestre, 2013) and rating models (Altman and Sabato, 2007, Van Gestel and Baesens, 2009). They are designed to control for SMEs' individual aspects explaining their bank financing needs. To fit French disclosure requirements, accounting standards and data availability, some slight changes are made compared with the variables used in disequilibrium models. The following control variables are retained :
  – Leverage SME = (Total of debt : at more than 1 year and less than 5 years)/Equity. A positive sign is expected as a more leveraged SME is in need of external funding, increasing its demand for bank loans.
  – Liquidity SME = (Net cash)/(Net total asset). The potential effect of small firms' liquidity ratio on borrowings is ambiguous. In Atanasova and Wilson (2004), Carbo-Valverde et al. (2009), Kremp and Sevestre (2013), this variable is appreciated as a measure of small firm internal resources. SMEs' liquidity acts as a substitute for external funding, reducing bank credit needs. A negative sign is therefore observable. However, a positive sign is also likely. More cash can be interpreted as an improved ability of small firms to service their debt, easing their borrowing conditions (Ogawa and Suzuki, 2000). The expected sign can either be positive or negative.
  – Profitability SME = (EBITDA[6])/(Net total asset). This variable is used as a proxy of SMEs' performance and quality (Carbo-Valverde et al., 2009). Nevertheless, the expected sign is dubious. On the one hand, an increase (decrease) in SMEs' profitability can enhance (undermine) their access to bank credit as their repayment capacity rises (goes down). On the other hand, more profitability can increase reinvestment and reduce external financing needs. Again, a positive or a negative sign can be observed.
  – Activity SME = (EBITDA)/(Interest payable and similar charges). A negative sign is expected for this variable. It is interpreted as a small firm contracting a credit to overcome a short term slowdown in its activity (i.e. a cash loan) or to fund longer term investments and foster future growth.

The table 4 presents the summary statistics of the firm-specific characteristics.

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6. Earnings Before Interest, Taxes, Depreciation, and Amortization.

TABLE 4 – Firm-specific characteristic summary statistics

	Variables	Obs.	Mean	Std. Dev.	Min	Max
Retail	Turnover	97272	3399.536	5266.986	0	49160.38
	Leverage SME	97270	-.7662	448.6651	-119996	39790
	Liquidity SME	97271	.157	.1986	-2.481	1
	Profitability SME	97271	.0872	.2555	-32.0462	9.9338
	Activity SME	85372	439.0356	22392.22	-4210854	2962375
Corporate	Turnover	21875	12510.55	11635.04	0	49896.58
	Leverage SME	21875	-5.6229	923.566	-136556.5	1907.332
	Liquidity SME	21796	.0671	.2215	-12.7239	14.4805
	Profitability SME	21796	.0795	.1307	-4.5259	3.8832
	Activity SME	21479	229.2691	33590.21	-2090596	4128548

We mark that Corporate SMEs have a turnover 3.5 times larger than Retail SMEs. On average, the leverage of SMEs is negative, which is explained by negative equity. During the 2008-2014 period, French small firms recorded losses, weighting on their balance sheet and translated by a negative leverage ratio. Those losses are 7 times larger for Corporate SMEs. Surprisingly, Retails and Corporates offer almost the same profitability on average. Even more unexpected, very small firms have a far better activity ratio. This is also probably due to the investigated period.

2.4.3 Bank-specific characteristics

In order to represent banks' individual position, variables representing bank characteristics are included in the regressions. Three bank-specific characteristics are retained :
– Performance Bank = Return On Average Equity. This trivial variable is meant to provide an evaluation of banks' profitability (Beck et al., 2009) and performance. Despite its philosophical proximity with the cost of capital, those two variables are different and not strongly correlated (see table 11 in the appendix). Indeed, ROE is an *ex post* measure and is observed as a result. Contrarily, our cost of capital is an *ex ante* variable that can be influenced by the management of bank funding strategies. In terms of expected sign, a more profitable bank is supposed to generate more retained earnings that can be used to fund more projects, including loans to SMEs. A positive sign can be observed. The fact remains that a more profitable bank invests in more lucrative assets, and not in small firm credits as such positions offer poor returns. A negative sign is also likely.
– Repayment Bank = Cost to income ratio. This ratio can be interpreted as banks' repayment capacity (International Monetary Fund, 2008). Van Gestel et al. (2005) use it as a proxy of managerial competences. An increase (decrease) in the ratio can indicate a decreasing (increasing) repayment capacity of the bank due to "managerial incompetences (competences)". In turns, such increased (decreased) ratio can shrink (raise) bank loans. A negative sign is therefore observable. The fact remains that SMEs are poorly profitable for banks, so an increased cost to income ratio can indicate a larger share of small firm credits in a bank portfolio. We can observe a positive sign too.
– Size Bank = Total Assets. The latter variable is a basic measure of banks' size (Camara et al., 2013, Berger et al., 2014). Larger banks are supposed to lend more, including to SMEs. A positive sign is expected as small firms' loan volume is assumed to be positively impacted by banks' size.

Summary statistics of bank-specific characteristics are presented in table 5.

TABLE 5 – Bank-specific characteristic summary statistics

	Variables	Obs.	Mean	Std. Dev.	Min	Max
Retail	Performance Bank	97272	6.2575	2.8101	-16.08	12.122
	Repayment Bank	96670	63.3702	7.6176	39.894	185.388
	Size Bank	96670	1.49e+09	1.09e+09	9969243	2.96e+09
Corporate	Performance Bank	21875	6.1127	3.0662	-16.08	12.122
	Repayment Bank	21747	64.581	8.9332	39.894	185.388
	Size Bank	21747	1.68e+09	1.00e+09	9969243	2.96e+09

Regarding the summary statistics of bank control variables, no major difference appear to exist between banks lending to Retail or Corporate SMEs. Statistics are close on average between banks granting loans to Retails and banks granting loans to Corporates. This indicates that banks are funding SMEs regardless of their respective size (contrarily to the view supported by "relationship lending" advocates (Elliehausen and Wolken, 1990, Berger and Udell, 1994, Peek and Rosengren, 1995, Udell, 2004, Berger et al., 2005, Grunert and Norden, 2011)).

In the appendix, table 10 presents in details the construction of our variables. Table 11 presents the correlations between variables. We add that the inclusion of time dummies does not influence our results (see table 7 page 17). They are thus excluded from our main regressions. We also exclude macroeconomic control variables such as GDP or M2 as they are only time-variant and would have otherwise weighted on our estimations.

3 Basel III effects on SMEs' access to bank credit

Our results for Retail and Corporate SMEs are presented in the same table 6 to ease comparisons. Firstly, the estimations for short term borrowings are displayed (columns 1,2,3 and 4) followed by longer term borrowings (columns 5,6,7 and 8). Secondly, results are exhibited with demand and supply regressions side to side (columns 1/2, 3/4, 5/6 and 7/8).

TABLE 6 – Basel III effects on SMEs, a 3SLS estimation

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | Retail Borrowings ST | | Corporate Borrowings ST | | Retail Borrowings LT | | Corporate Borrowings LT | |
Variables	Demand	Supply	Demand	Supply	Demand	Supply	Demand	Supply
Cost of Capital	0.0153***	0.0151***	0.0134**	0.0143**	0.0020	0.0020	0.0029	0.0029
	(0.0031)	(0.0037)	(0.0058)	(0.0068)	(0.0015)	(0.0016)	(0.0030)	(0.0031)
NSFR	-0.5253***	-0.4670***	-0.5192***	-0.4177*	0.2132***	0.2271***	-0.1779*	-0.1741*
	(0.0960)	(0.1220)	(0.1892)	(0.2360)	(0.0458)	(0.0515)	(0.0970)	(0.1055)
Regulatory Leverage	-0.0810	-0.1272	-0.4715***	-0.5805***	-0.1851***	-0.1946***	-0.0887	-0.0927
	(0.0680)	(0.0960)	(0.1380)	(0.1886)	(0.0331)	(0.0393)	(0.0714)	(0.0809)
Leverage SME	0.0108***		0.0043		0.0234***		0.0126***	
	(0.0029)		(0.0050)		(0.0011)		(0.0016)	
Liquidity SME	-0.1034***		-0.0951***		0.0007		0.0041***	
	(0.0022)		(0.0039)		(0.0008)		(0.0013)	
Profitability SME	0.0090		-0.0322*		0.0246***		0.0162***	
	(0.0096)		(0.0185)		(0.0034)		(0.0060)	
Activity SME	-0.0072		0.0064		-0.0118***		-0.0102***	
	(0.0045)		(0.0086)		(0.0016)		(0.0028)	
Performance Bank		0.0019		0.0091		-0.0016		-0.0011
		(0.0271)		(0.0496)		(0.0085)		(0.0145)
Repayment Bank		0.0725		0.0409		-0.0045		-0.0106
		(0.1250)		(0.2405)		(0.0382)		(0.0680)
Size Bank		-0.0037		-0.0023		-0.0023		-0.0008
		(0.0153)		(0.0293)		(0.0049)		(0.0088)
Constant	12.8232***	11.7535***	16.8297***	15.9442***	9.8479***	10.0000***	15.0348***	15.2033***
	(0.5177)	(1.7327)	(1.0411)	(3.2722)	(0.2456)	(0.5709)	(0.5287)	(1.0446)
Observations	27,039	27,039	9,088	9,088	34,258	34,258	10,645	10,645

Notes : Cost of Capital=Chatelain and Tiomo (2002)'s cost of capital, NSFR=Vazquez and Federico (2015)'s NSFR, Regulatory Leverage=Equity/(Total assets), Leverage SME=(Total of debt : at more than 1 year and less than 5 years)/Equity, Liquidity SME = (Net cash)/(Net total asset), Profitability SME = (EBITDA [7])/(Net total asset), Activity SME = (EBITDA)/(Interest payable and similar charges), Performance Bank = Return On Average Equity, Repayment Bank = Cost to income ratio, Size Bank = Total Assets. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Broadly, Basel III variables appear to be very significant. In this perspective, the new regulatory scheme seems to affect SMEs' access to bank credit. We observe that firm-specific control variables are often significant. Interestingly, bank-specific control variables are never significant. This can be interpreted as banks' profile having no effect on SME borrowings.

Our results of Basel III effects exhibit some remarkable features. Accordingly, the cost of capital only impacts short term borrowings. It means that a decreased cost of capital due to increased equity volume can affect negatively short term credits. This observation supports the idea that banks can rebalance their portfolios and reduce their least profitable exposures like SMEs' short term credit. Eventually, banks can turn themselves towards even riskier assets to maintain their profitability. A regulatory adjusted risk/return analysis can be at stack.

The introduction of the NSFR has a strong negative effect on SME loans. The NSFR has often the larger coefficient in regressions. Interpreting our results, the long term liquidity ratio can widely reduce SMEs' short term borrowings. This confirms one major concern in the literature : seeing the liquidity ratios being the most constraining regulatory requirements. Notwithstanding, the NSFR is less significant for longer term borrowings. Its sign is even positive for Retails' long term borrowings. This particular aspect suggests that regulatory alleviations for very small firms actually facilitate their access to bank credit. Still, according to our results, the introduction of the long term liquidity ratio can generally reduce SMEs' bank credits.

Results are mixed for the regulatory leverage ratio. Retails' long term borrowings and Corporates' short term borrowings are negatively impacted by this new standard. As expected, the introduction of a non-risk based capital ratio can limit bank lending especially to the riskiest borrowers like SMEs. Still, Retails' short term borrowings and Corporates' long term borrowings can remain unaffected by the leverage ratio. We interpret this insignificance as the rebalancing of bank portfolios towards riskier assets and expositions offering regulatory relieves.

All things considered, Basel III requirements can impact negatively SMEs' access to bank credit. Very small firms can be the most strongly affected by the new standards, disregarding loan maturity. This conclusion countervails our prime assumption. Larger small firms, and especially their long term credits, can also be affected by the negative effects of the regulation. Broadly, SMEs' short term credit can face the strongest negative consequences of the new regulation, in spite of regulatory alleviations. This can have dramatic repercussions for SMEs as they heavily rely on such funding for their day to day operations. In this regard, our conclusions contradict the results of Kremp and Sevestre (2013).

Investigating control variables, we notice that SMEs' leverage ratio exhibits an highly significant positive sign. It means that a leveraged firm needs external funding which includes bank loans. This observation is especially true for longer term borrowings. Concerning small firms' liquidity ratio, the results offer an interesting feature. For short term loans, liquidity acts as a substitute for external funding, reducing bank loans. This observation supports Kremp and Sevestre (2013) conclusions on cash. Still, the access to longer term bank credits is facilitated by SMEs' liquidity. It indicates that liquidity also allows a company to serve its debt more easily. We can mark the same pattern for SMEs' profitability ratio : for short term borrowings, an increased profitability pushes bank credits down as they are replaced by small firms' internal resources. For longer term borrowings, an increased profitability eases small firms' access to bank credit. Small firms' activity does not seem to influence the access to short term bank credit. Nevertheless, longer term borrowings are negatively affected by SMEs' activity. So, small firms definitively use bank loans to invest and foster their future growth as their activity decreases. It also indicates that banks found their decision to grant a loan on perspectives and not only on passed observations.

As mentioned, and rather surprisingly, bank control variables are always insignificant. This result is very interesting as it confirms that banks' size does not influence credit allocation to SMEs. From a broader perspective, the lack of significance of those variables tend to prove that lending to SMEs is part of banks' core business. Hence, lending to small firms can remain unaffected by the situation of credit institutions. Actually, SME market is almost as strategic for the banking sector as the other way around. Small firms can take advantage of the recent refocusing of the banking system on its core business which provides stable returns and cross-selling opportunities (Shin, 2003, de la Torre et al., 2010, Valet, 2011).

Despite of the stability of our main regressions, we conduct robustness checks in the following section.

4   Robustness checks

The first robustness checks add year dummies to the baseline regressions (table 4). To avoid perfect mutlicolinearity (Montoro and Rojas-Suarez, 2012) year 2014 is eliminated as a dummy.

TABLE 7 – Basel III effects on SMEs, a 3SLS estimation with dummies

Variables	(1) Retail Borrowings ST Demand	(2) Retail Borrowings ST Supply	(3) Corporate Borrowings ST Demand	(4) Corporate Borrowings ST Supply	(5) Retail Borrowings LT Demand	(6) Retail Borrowings LT Supply	(7) Corporate Borrowings LT Demand	(8) Corporate Borrowings LT Supply
Cost of Capital	-0.0002	-0.0003	-0.0037	-0.0037	-0.0014	-0.0014	-0.0014	-0.0014
	(0.0041)	(0.0049)	(0.0082)	(0.0098)	(0.0019)	(0.0021)	(0.0042)	(0.0045)
NSFR	-0.2756*	-0.2234	-0.1628	-0.1165	0.1376**	0.1418*	-0.0918	-0.0917
	(0.1456)	(0.1740)	(0.3198)	(0.3758)	(0.0683)	(0.0742)	(0.1596)	(0.1690)
Regulatory Leverage	-0.1461	-0.1733	-0.6008***	-0.6583**	-0.1190***	-0.1178**	-0.1192	-0.1211
	(0.0914)	(0.1219)	(0.2002)	(0.2561)	(0.0438)	(0.0505)	(0.1013)	(0.1116)
Leverage SME	0.0107***		0.0042		0.0234***		0.0126***	
	(0.0029)		(0.0050)		(0.0011)		(0.0016)	
Liquidity SME	-0.1038***		-0.0953***		0.0007		0.0041***	
	(0.0022)		(0.0039)		(0.0008)		(0.0013)	
Profitability SME	0.0094		-0.0303		0.0245***		0.0164***	
	(0.0096)		(0.0185)		(0.0034)		(0.0060)	
Activity SME	-0.0074*		0.0056		-0.0118***		-0.0102***	
	(0.0045)		(0.0086)		(0.0016)		(0.0028)	
Performance Bank		0.0023		0.0263		-0.0034		-0.0009
		(0.0328)		(0.0635)		(0.0101)		(0.0184)
Repayment Bank		0.0963		0.1280		-0.0040		-0.0122
		(0.1479)		(0.2925)		(0.0442)		(0.0814)
Size Bank		-0.0012		-0.0029		-0.0011		-0.0007
		(0.0164)		(0.0321)		(0.0053)		(0.0097)
2008	10.9851***	-	14.3826***	-	10.1309***	10.2937***	-	-0.1375
	(0.8058)	-	(1.7785)	-	(0.3762)	(0.6870)	-	(0.0904)
2009	11.3563***	0.3762***	14.8893***	0.5410***	10.2008***	10.3604***	0.0958	-0.0432
	(0.7680)	(0.0953)	(1.6882)	(0.2020)	(0.3594)	(0.6724)	(0.0813)	(0.0571)
2010	11.5265***	0.5400***	14.9483***	0.5702***	10.2044***	10.3644***	0.1404*	-
	(0.7631)	(0.0954)	(1.6768)	(0.2054)	(0.3573)	(0.6722)	(0.0850)	-
2011	11.4080***	0.4055***	14.9234***	0.5393***	10.1831***	10.3413***	0.1427*	0.0036
	(0.7745)	(0.0904)	(1.7052)	(0.1907)	(0.3625)	(0.6766)	(0.0786)	(0.0576)
2012	11.3816***	0.3860***	14.9466***	0.5611***	10.1362***	10.2903***	0.1304	-0.0092
	(0.7541)	(0.0964)	(1.6561)	(0.2064)	(0.3529)	(0.6710)	(0.0853)	(0.0632)
2013	11.2909***	0.2906**	14.7600***	0.3478	10.1005***	10.2526***	0.0985	-0.0421
	(0.7392)	(0.1137)	(1.6192)	(0.2515)	(0.3463)	(0.6664)	(0.1036)	(0.0643)
Constant	0.0000	9.6166***	0.0000	12.8448***	0.0000	0.0000	14.4446***	14.7822***
	(0.0000)	(2.0555)	(0.0000)	(4.0587)	(0.0000)	(0.0000)	(0.8822)	(1.3175)
Observations	27,039	27,039	9,088	9,088	34,258	34,258	10,645	10,645

Notes : Cost of Capital=Chatelain and Tiomo (2002)'s cost of capital, NSFR=Vazquez and Federico (2015)'s NSFR, Regulatory Leverage=Equity/(Total assets), Leverage SME=(Total of debt : at more than 1 year and less than 5 years)/Equity, Liquidity SME = (Net cash)/(Net total asset), Profitability SME = (EBITDA [8])/(Net total asset), Activity SME = (EBITDA)/(Interest payable and similar charges), Performance Bank = Return On Average Equity, Repayment Bank = Cost to income ratio, Size Bank = Total Assets. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The results remain unchanged by the introduction of time dummies. The variables mostly keep their significance, sign and coefficient. We underline that Retails' activity ratio turns significant with the expected negative sign for short term borrowings. Bank-specific control variables stay insignificant. Regarding dummy variables, they are often collinear with other explanatory variables and particularly, the constant term (column 2, column 4, column 7 and column 8). This justify our decision to exclude those variables from the main regressions too. There is no notable modification for Basel III variables except the cost of capital which becomes insignificant. Those supplementary regressions strengthen the robustness of our main results.

The second robustness checks use Generalized Least Squares (GLS) in the following table 8. The GLS allow to violate OLS assumptions on homoskedasticity or uncorrelated errors. A panel-specific AR(1) autocorrelation structure is retained with an heteroscedastic error structure.

TABLE 8 – Basel III effects on SMEs, a GLS estimation

Variables	(1) Retail Borrowings ST	(2) Corporate Borrowings ST	(3) Retail Borrowings LT	(4) Corporate Borrowings LT
Cost of Capital	0.0161***	0.0120***	0.0014***	0.0043***
	(0.0001)	(0.0001)	(0.0000)	(0.0002)
NSFR	-0.4846***	-0.4595***	0.1318***	-0.1533***
	(0.0045)	(0.0142)	(0.0014)	(0.0090)
Regulatory Leverage	0.1790***	-0.1479***	-0.1805***	0.0653***
	(0.0014)	(0.0072)	(0.0005)	(0.0134)
Leverage SME	0.0427***	0.0135***	0.1833***	0.1449***
	(0.0001)	(0.0005)	(0.0001)	(0.0011)
Liquidity SME	-0.4082***	-0.3993***	0.0051***	0.0386***
	(0.0001)	(0.0008)	(0.0001)	(0.0003)
Profitability SME	0.0369***	-0.1355***	0.1881***	0.0966***
	(0.0006)	(0.0020)	(0.0004)	(0.0034)
Activity SME	-0.0302***	0.0317***	-0.0908***	-0.0644***
	(0.0003)	(0.0009)	(0.0002)	(0.0018)
Performance Bank	-0.0994***	-0.1573***	-0.0188***	0.0063***
	(0.0003)	(0.0019)	(0.0001)	(0.0024)
Repayment Bank	-0.2854***	-0.4906***	0.0613***	0.4404***
	(0.0032)	(0.0196)	(0.0018)	(0.0238)
Size Bank	0.0755***	0.0536***	0.0034***	0.0318***
	(0.0006)	(0.0020)	(0.0002)	(0.0033)
Constant	13.5355***	19.7241***	9.2212***	8.8500***
	(0.0747)	(0.3052)	(0.0282)	(0.2852)
Observations	25,261	8,759	32,811	10,354
χ^2	1.830e+08	1.020e+07	1.410e+08	3.380e+07

Notes : Cost of Capital=Chatelain and Tiomo (2002)'s cost of capital, NSFR=Vazquez and Federico (2015)'s NSFR, Regulatory Leverage=Equity/(Total assets), Leverage SME=(Total of debt : at more than 1 year and less than 5 years)/Equity, Liquidity SME = (Net cash)/(Net total asset), Profitability SME = (EBITDA[9])/(Net total asset), Activity SME = (EBITDA)/(Interest payable and similar charges), Performance Bank = Return On Average Equity, Repayment Bank = Cost to income ratio, Size Bank = Total Assets. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

In this particular specification, all variables are highly significant. The variables have mostly the expected sign and confirm our estimations in the 3SLS models. In this specification, bank-specific characteristics are highly significant. We observe that the most profitable banks tend to lend less to small firms. The repayment ratio underlines how short term credit to SMEs are costly for banks. Banks' size positively influences SMEs' credit endowments. This observation supports the "transaction lending" side of the literature and our choice to use only listed banks. Basel III behaves as expected after the main regressions. Still, it is worth mentioning that the regulatory leverage ratio exhibits a positive sign for Retails' short term lending and Corporates' long term lending. Without contradicting the main results, it can be interpreted as the leverage ratio pushing banks to rebalance their portfolios towards more profitable/risky exposures (like

Corporates' long term lending) and expositions offering regulatory alleviations (like Retails' short term lending). In spite of the significance of those results, we promote the 3SLS as the baseline model because it allows to disentangle demand from supply variables and to account for potential endogeneity.

After having modified the model, we test an alternative variable for our cost of capital. We use a Weighted Average Cost of Capital ("WACC") as a proxy of the capital ratio as in de Bandt et al. (2014). Notwithstanding, we make some adjustments to the previous ratio as we promote observed variables over estimated ones. Our variable is computed as follows :

$$WACC = \frac{((E_{jt} * r_{E_{jt}}) + ((D_{jt} * r_{D_{jt}})(1 - \tau_t))}{(E_{jt} + D_{jt})} \tag{5}$$

E_{jt} is the common equity, $r_{E_{jt}}$ is the Return on Average Equity, D_{jt} is the bank gross debt, $r_{D_{jt}}$ is the interest expense on the average interest-bearing liabilities and τ_t is the corporate tax rate. The results are displayed in table 9.

TABLE 9 – Basel III effects on SMEs, a 3SLS estimation WACC

Variables	(1) Retail Borrowings ST Demand	(2) Retail Borrowings ST Supply	(3) Corporate Borrowings ST Demand	(4) Corporate Borrowings ST Supply	(5) Retail Borrowings LT Demand	(6) Retail Borrowings LT Supply	(7) Corporate Borrowings LT Demand	(8) Corporate Borrowings LT Supply
WACC	0.0751**	0.0808*	0.0505	0.0390	0.0058	0.0080	0.0531*	0.0521
	(0.0296)	(0.0489)	(0.0570)	(0.0864)	(0.0140)	(0.0184)	(0.0294)	(0.0355)
NSFR	-0.4856***	-0.4542***	-0.5286***	-0.4526**	0.2548***	0.2724***	-0.0105	-0.0058
	(0.1019)	(0.1206)	(0.1917)	(0.2237)	(0.0475)	(0.0514)	(0.0950)	(0.1007)
Regulatory Leverage	0.3721***	0.3250**	-0.1417	-0.2494	-0.1696***	-0.1785***	0.1115	0.1056
	(0.1185)	(0.1419)	(0.2299)	(0.2672)	(0.0558)	(0.0608)	(0.1185)	(0.1256)
Leverage SME	0.0106***		0.0043		0.0252***		0.0140***	
	(0.0026)		(0.0045)		(0.0010)		(0.0015)	
Liquidity SME	-0.1058***		-0.0963***		0.0007		0.0045***	
	(0.0020)		(0.0036)		(0.0008)		(0.0012)	
Profitability SME	0.0090		-0.0332**		0.0257***		0.0175***	
	(0.0088)		(0.0168)		(0.0031)		(0.0055)	
Activity SME	-0.0073*		0.0072		-0.0121***		-0.0107***	
	(0.0040)		(0.0078)		(0.0015)		(0.0025)	
Performance Bank		-0.0051		0.0007		0.0004		0.0005
		(0.0146)		(0.0259)		(0.0046)		(0.0075)
Repayment Bank		0.0376		0.0098		-0.0008		-0.0076
		(0.1198)		(0.2333)		(0.0368)		(0.0677)
Size Bank		-0.0128		0.0091		-0.0042		-0.0007
		(0.0302)		(0.0534)		(0.0094)		(0.0161)
Constant	9.1468***	8.7225***	14.5058***	14.1046***	9.3471***	9.4296***	11.8423***	12.0036***
	(1.5824)	(2.1929)	(2.9793)	(4.1451)	(0.7473)	(0.8843)	(1.5235)	(1.7416)
Observations	32,958	32,958	11,011	11,011	42,413	42,413	13,102	13,102

Notes : Cost of Capital=Chatelain and Tiomo (2002)'s cost of capital, NSFR=Vazquez and Federico (2015)'s NSFR, Regulatory Leverage=Equity/(Total assets), Leverage SME=(Total of debt : at more than 1 year and less than 5 years)/Equity, Liquidity SME = (Net cash)/(Net total asset), Profitability SME = (EBITDA [10])/(Net total asset), Activity SME = (EBITDA)/(Interest payable and similar charges), Performance Bank = Return On Average Equity, Repayment Bank = Cost to income ratio, Size Bank = Total Assets. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Changing the method to evaluate banks' cost of capital leaves our results mainly unchanged. This specification strengthens all our previous observations. In this regard, all our variables present the same sign and almost the same coefficient compared with the main regressions. Noticeably, the regulatory leverage ratio exhibits a positive sign for Retails' borrowings at short term as in the FGLS estimations. Bank-specific control variables are still insignificant.

The supplementary estimations confirm our main results, especially when changing signs are observed. The number of estimations ran and the stability of the results across all specifications allow us to be confident in the robustness of our estimations and the choice of our main model.

5   Conclusion

Following an unprecedented international financial crisis, the Basel Committee decided to implement a new set of reforms aiming at improving banks' solvency and liquidity. Yet, this tightening in the regulatory environment can burden on the most risky/bank-dependent borrowers like SMEs. This article aims at shedding light on Basel III potential effects on small firms from an empirical standpoint as literature on the subject remains relatively sparse.

We conclude that the new regulation can have negative effects on SMEs' access to bank credit. Very small firms can be the most adversely affected by the new set of reforms and face the largest decrease in their loan volume. SMEs' short term credit can particularly be affected by the downward trend in bank funding. Such outcome can be very detrimental to these borrowers as they heavily rely on banks especially for cash loans. Those unfavourable effects must be taken into account by authorities when implementing the new regulatory standards. In this respect, the regulatory alleviations enjoyed by very small firms seem inefficient. More, such abatements are likely to rebalance bank portfolios and diverge them towards riskier expositions. In accordance to the literature, the NSFR can play a major part in the contraction of small firms' access to bank credits. Briefly, banks seem to adjust their portfolios following a regulatory adjusted risk/return analysis. Capital and liquidity relieves appear to create regulatory arbitrages and to distort bank loans to SMEs. As Ayadi et al. (2015) noticed, Basel III can reduce the efficient allocation of banks' resources. Hence, abatements should probably be removed.

Going further, future research could investigate the responsibility of Basel III in the slowing down of SMEs' bank credit growth relatively to small firms' self-exclusion. Firm-specific characteristics could be expended by the inclusion of qualitative variables. Especially as bank-specific characteristics remain mostly insignificant in our main regressions. Finally, investigate the effects of the reforms on other credit-type exposures such as leasing or trade credit could be appealing as small firms are likely to turn themselves towards other sources of funding.

Eventually, the impact of Basel III depends on banks' initial position in terms of capital and liquidity. In France, banks are already virtually complying with the new set of reforms due to market pressures. Therefore, most of the negative effects of the new regulation can have already been felt by SMEs.

Appendix

<div align="center">

TABLE 10 – Construction of variables

</div>

Variables		Names	Construction	Sources	Expected signs
Dependant variables		Borrowings ST	Borrowings and debts from credit institutions at less than 1 year at the origin : gross amount	BvD Diane+	
		Borrowings LT	Borrowings and debts from credit institutions at more than 1 year : at more than 1 year	BvD Diane+	
Explanatory variables	Basel III	Cost of Capital	cf. equation 1 page 7	BvD Bankscope, AMECO, OECD	+
		NSFR	cf. table 2 page 10	Vazquez and Federico (2015)	+/-
		Regulatory Leverage	(Equity)/(Total assets)	BvD Bankscope	+/-
	Firm specific characteristics	Leverage SME	(Total of debt : at more than 1 year and less than 5 years)/Equity	BvD Diane+	+
		Liquidity SME	(Net cash)/(Net total asset)	BvD Diane+	+/-
		Profitability SME	(EBITDA)/(Net total asset)	BvD Diane+	+/-
		Activity SME	(EBITDA)/(Interest payable and similar charges)	BvD Diane+	-
	Bank specific characteristics	Performance Bank	Return on average equity	BvD Bankscope	+/-
		Repayment Bank	Cost to income ratio	BvD Bankscope	+/-
		Size Bank	Total assets	BvD Bankscope	+

TABLE 11 – Correlations

Variables	Borrowings ST	Borrowings LT	Cost of Capital	NSFR	Regulatory Leverage	Leverage SME	Liquidity SME	Profitability SME	Activity SME	Performance Bank	Repayment Bank	Size Bank
Borrowings ST	1.0000											
Borrowings LT	0.2706	1.0000										
	(0.0000)											
Cost of Capital	-0.0116	-0.0297	1.0000									
	(0.0068)	(0.0000)										
NSFR	-0.0481	-0.0553	0.2985	1.0000								
	(0.0000)	(0.0000)	(0.0000)									
Regulatory Leverage	-0.0496	-0.0703	0.5928	0.8060	1.0000							
	(0.0000)	(0.0000)	(0.0000)	(0.0000)								
Leverage SME	0.0520	0.3130	0.0147	0.0505	0.0380	1.0000						
	(0.0000)	(0.0000)	(0.0006)	(0.0000)	(0.0000)							
Liquidity SME	-0.5259	-0.0650	0.0332	0.0364	0.0524	-0.0115	1.0000					
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0032)						
Profitability SME	-0.0839	0.0126	0.0071	0.0739	0.0542	0.1507	0.1730	1.0000				
	(0.0000)	(0.0027)	(0.0265)	(0.0000)	(0.0000)	(0.0000)	(0.0000)					
Activity SME	-0.1124	-0.0327	0.0092	0.0555	0.0480	0.1054	0.1883	0.9514	1.0000			
	(0.0000)	(0.0000)	(0.0065)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)				
Performance Bank	-0.0060	-0.0034	0.2399	0.2530	0.0791	0.0190	0.0068	0.0307	0.0195	1.0000		
	(0.1208)	(0.4165)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0204)	(0.0000)	(0.0000)			
Repayment Bank	0.0396	0.0532	-0.4664	-0.6007	-0.6756	-0.0339	-0.0434	-0.0435	-0.0390	-0.3578	1.0000	
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)		
Size Bank	0.0534	0.0720	-0.4420	-0.8674	-0.9301	-0.0439	-0.0477	-0.0652	-0.0531	-0.1159	0.5912	1.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	

Significance levels in parentheses

References

Aggarwal, R. and Jacques, K. T. (2001), 'The impact of FDICIA and prompt corrective action on bank capital and risk : Estimates using a simultaneous equations model', *Journal of Banking & Finance* **25**(6), 1139–1160. 6

Agénor, P.-R., Alper, K. and Pereira da Silva, L. (2013), 'Capital Regulation, Monetary Policy and Financial Stability', *International Journal of Central Banking* **9**(3), 193–238. 4

Ait Yahia, K., Forest, J. and Fernandes, B. (2014), 'Défaillances d'entreprises', *Panorama Coface* (Avril - Mai). 3

Altman, E. I. and Sabato, G. (2005), 'Effects of the new Basel capital accord on bank capital requirements for SMEs', *Journal of Financial Services Research* **28**(1/2/3), 15–42. 4

Altman, E. I. and Sabato, G. (2007), 'Modelling Credit Risk for SMEs : Evidence from the U.S. Market', *Abacus* **43**(3), 332–357. 4, 6, 11

Amable, B., Chatelain, J. B. and De Bandt, O. (2002), 'Optimal capacity in the banking sector and economic growth', *Journal of Banking and Finance* **26**(2-3), 491–517. 2

Ambler, T. (2011), How Basel III threatens small businesses. 3

Angelini, P., Clerc, L., Cùrdia, V., Gambacorta, L. and Gerali, A. (2011), BASEL III : Long-term impact on economic performance and fluctuations. 4, 8

Angelini, P. and Gerali, A. (2012), Banks' reactions to Basel-III. 9

Angelkort, A. and Stuwe, A. (2011), *Basel III and SME financing*, Friedrich-Ebert-Stiftung Zentrale Aufgaben. 3

Atanasova, C. V. and Wilson, N. (2004), 'Disequilibrium in the UK corporate loan market', *Journal of Banking & Finance* **28**(3), 595–614. 4, 6, 11

Avery, R. B. and Berger, A. N. (1990), Risk-based capital and deposit insurance reform. 2

Ayadi, R., Naceur, S. B., Casu, B. and Quinn, B. (2015), 'Does Basel Compliance Matter for Bank Performance ?', *Journal of Financial Stability* **23**(July 2014), 15–32. 21

Banque de France (2013), Le financement des PME en France Octobre 2013 - Publication trimestrielle, Technical report, Banque de France. 3

Banque de France (2015), 'Le financement des PME en France Juin 2015 - Publication trimestrielle', pp. 1–6. 3

Barakova, I. and Palvia, A. (2014), 'Do banks' internal Basel risk estimates reflect risk ?', *Journal of Financial Stability* **13**, 167–179. 3

Basel Committee on Banking Supervision (2006), International convergence of capital measurement and capital standards - A revised framework - Comprehensive version, Technical Report June 2004, Bank for International Settlements. 3, 4, 7

Basel Committee on Banking Supervision (2009), International framework for liquidity risk measurement, standards and monitoring, Technical report. 5

Basel Committee on Banking Supervision (2010*a*), An assessment of the long-term economic impact of stronger capital and liquidity requirements, Technical Report August, Bank for International Settlements. 2, 9

Basel Committee on Banking Supervision (2010*b*), Basel III : International framework for liquidity risk measurement, standards and monitoring, Technical Report December, Bank for International Settlements. 4, 7

Basel Committee on Banking Supervision (2011), Basel III : A global regulatory framework for more resilient banks and banking systems, Technical Report June, Bank for International Settlements. 2

Basel Committee on Banking Supervision (2012), The policy implications of transmission channels between the financial system and the real economy. 2

Beck, T., Demirgüc-kunt, A. and Maksimovic, V. (2005), 'Financial and Legal Constraints to Growth : Does Firm Size Matter ?', *The Journal of Finance* **LX**(1), 137 – 177. 3

Beck, T., Demirgüc-Kunt, A. and Perìa, M. S. M. (2010), 'Bank Financing for SMEs : Evidence Across Countries and Bank Ownership Types', *Journal of Financial Services Research* **39**(1-2), 35–54. 3, 5

Beck, T., Demirguc-Kunt, A., Laeven, L. and Maksimovic, V. (2006), 'The determinants of financing obstacles', *Journal of International Money and Finance* **25**(6), 932–952. 6

Beck, T., Demirguc-kunt, A. and Levine, R. (2009), Financial institutions and markets across countries and over time-data and analysis. 12

Berger, A. N., DeYoung, R., Flannery, M. J., Lee, D. and Öztekin, z. (2008), 'How do large banking organizations manage their capital ratios ?', *Journal of Financial Services Research* **34**(2-3), 123–149. 9

Berger, A. N. and Frame, W. S. (2007), 'Small Business Credit Scoring and Credit Availability', *Journal of Small Business Management* **45**(1), 5–22. 5

Berger, A. N., Goulding, W. and Rice, T. (2014), 'Do small businesses still prefer community banks ?', *Journal of Banking & Finance* (March). 6, 12

Berger, A. N., Miller, N. H., Petersen, M. A., Rajan, R. G. and Stein, J. C. (2005), 'Does function follow organizational form ? Evidence from the lending practices of large and small banks', *Journal of Financial Economics* **76**(2), 237–269. 13

Berger, A. N. and Udell, G. F. (1994), 'Did risk-based capital allocate bank credit and cause a" credit crunch" in the United States ?', *Journal of Money, Credit and Banking* **26**(3), 585–628. 13

Berger, A. N. and Udell, G. F. (2002), 'Small business credit availability and relationship lending : the importance of bank organisational structure', *the Economic Journal* **112**(477), F32–F53. 3

Bernanke, B. S. and Lown, C. S. (1991), 'The credit crunch', *Brookings Papers on Economic Activity* **2**, 205 – 247. 2

Betbèze, J.-P. (2014), 'Financer les PME en France : Encore un "papier" !', *Revue d'économie financière* **114**(Juin), 31–38. 3

Blundell-Wignall, A. and Atkinson, P. (2010), 'Thinking beyond Basel III : Necessary solutions for capital and liquidity', *OECD Journal : Financial Market Trends* **2010**(1), 9–33. 10

Bonino, C., Jarvis, R. and Schizas, E. (2011), CRD IV and small businesses : revisiting the evidence in Europe, Technical report, The Association of Chartered Certified Accountants. 2

Camara, B., Lepetit, L. and Tarazi, A. (2013), 'Ex ante capital position, changes in the different components of regulatory capital and bank risk', *Applied Economics* **45**(34), 4831–4856. 12

Carbo-Valverde, S., Rodriguez-Fernandez, F. and Udell, G. F. (2009), 'Bank Market Power and SME Financing Constraints', *Review of Finance* **13**(2), 309–340. 3, 4, 6, 11

Cardone-Riportella, C., Trujillo-Ponce, A. and Briozzo, A. (2011), What do Basel capital accords mean for SMEs ? 3

Chatelain, J.-B. and Amable, B. (2001), 'Can financial infrastructures foster economic development ?', *Journal of Development Economics* **64**(2), 481–498. 3

Chatelain, J.-b. and Tiomo, A. (2002), 'Investment and the cost of capital in the nineties in France : a panel data investigation', *IFO Studien* **48**(4), 655–684. 4, 8, 14, 17, 18, 20

Claessens, S., Herring, R. J., Schoenmaker, D. and Summe, K. A. (2010), A safer world financial system : Improving the resolution of systemic institutions. 2

Claessens, S., Underhill, G. R. D. and Zhang, X. (2008), 'The Political Economy of Basle II : The costs for poor countries', *The World Economy* **31**(3), 313 – 344. 5

Cohen, B. H. and Scatigna, M. (2014), Banks and capital requirements : channels of adjustment. 9

Cosimano, T. F. and Hakura, D. S. (2011), Bank behavior in response to Basel III : A cross-country analysis. 4, 9

Covas, F. and Fujita, S. (2010), 'Procyclicality of capital requirements in a general equilibrium model of liquidity dependence', *International Journal of Central Banking* **6**(4), 137–173. 4

Darracq Pariès, M., Kok Sorensen, C. and Rodriguez-Palenzuela, D. (2011), 'Macroeconomic propagation under different regulatory regimes : Evidence from an estimated dsge model for the euro area', *International Journal of Central Banking* **7**(4), 49–113. 4

de Bandt, O., Camara, B., Pessarossi, P. and Rose, M. (2014), 'Regulatory changes and the cost of equity : evidence from French banks', *Débat économiques et financiers* **11**. 19

de la Torre, A., Martìnez Perìa, M. S. and Schmukler, S. L. (2010), 'Bank involvement with SMEs : Beyond relationship lending', *Journal of Banking & Finance* **34**(9), 2280–2293. 5, 16

Demirgüc-kunt, A., Beck, T. and Honohan, P. (2008), *Finance for all ? Policies and pitfalls in expanding access*, The International Bank for Reconstruction and Development / The World Bank. 2, 3, 5

Dewatripont, M. (2014), 'European banking : Bailout, bail-in and state aid control', *International Journal of Industrial Organization* **34**(1), 37–43. 2, 3

Dewatripont, M. and Tirole, J. (1993), 'Efficient governance structure : implications for banking regulation', *ULB Institutional Repository* . 2

Dietrich, A., Hess, K. and Wanzenried, G. (2014), 'The good and bad news about the new liquidity rules of Basel III in Western European countries', *Journal of Banking & Finance* **44**, 13–25. 2

Dietsch, M. and Mahieux, X. (2014), 'Comprendre le déficit de financement des PME pour stimuler leur croissance', *Revue d'économie financière* **114**(Juin), 17–30. 3

Dietsch, M. and Petey, J. (2002), 'The credit risk in SME loans portfolios : modeling issues, pricing, and capital requirements', *Journal of Banking & Finance* **26**, 303–322. 4, 5

Dietsch, M. and Petey, J. (2004), 'Should SME exposures be treated as retail or corporate exposures ? A comparative analysis of default probabilities and asset correlations in French and German SMEs', *Journal of Banking & Finance* **28**(4), 773–788. 4

Dietsch, M. and Tilloy, L. (2010), 'Bâle III - Vers une dégradation de l'accès au crédit pour les PME ?', *Revue Banque* **272**. 2, 3, 4

Elliehausen, G. E. and Wolken, J. D. (1990), 'Banking markets and the use of financial services by small and medium-sized businesses', *Federal Reserve Bulletin* **160**(October), 801 − 817. 13

Elliott, D. J. (2009), Quantifying the cost on lending of increased capital requirements. 4, 8, 9

Elliott, D. J., Salloy, S. and Santos, A. O. (2012), Assessing the cost of financial regulation. 4, 8, 9

European Banking Authority (2012), Assessment of SME proposals for CRD IV/CRR, Technical Report September, European Banking Authority. 4

European Commission (2005), SME Access to Finance - Executive Summary, Technical Report October, European Commission. 3

Frame, W. S., Srinivasan, A. and Woosley, L. (2001), 'The effect of credit scoring on small-business lending', *Journal of Money, Credit and Banking* **33**(3), 813 − 818. 5

Furlong, F. T. and Keeley, M. C. (1989), 'Capital regulation and bank risk-taking : A note', *Journal of Banking & Finance* **13**(6), 883–891. 2

Galindo, A. J., Rojas-Suarez, L. and del Valle, M. (2012), Capital requirements under Basel III in Latin America - The cases of Bolivia, Colombia, Ecuador and Peru. 2

Griffith-Jones, S. and Ocampo, J. A. (2010), International financial architecture seen through the lense of economic crisis : Achievements and numerous challenges. 2

Griffith-Jones, S. and Persaud, A. (2008), 'The pro-cyclical impact of Basle II on emerging markets and its political economy', *Capital Market Liberalization and Development* **May**, 1–26. 2

Griffith-Jones, S., Silvers, D. and Thiemann, M. (2010), 'Turning the financial sector from a bad master to a good servant ; The role of regulation and taxation'. 2

Gropp, R. and Heider, F. (2010), 'The Determinants of Bank Capital Structure', *Review of Finance* **14**(4), 587–622. 9

Grunert, J. and Norden, L. (2011), 'Bargaining power and information in SME lending', *Small Business Economics* **39**(2), 401–417. 13

Hausman, J. A. (1978), 'Specification tests in econometrics', *Econometrica* **46**(6), 1251–1271. 7

Hong, H., Huang, J.-Z. and Wu, D. (2014), 'The information content of Basel III liquidity risk measures', *Journal of Financial Stability* **15**, 91–111. 10

Institute of International Finance (2010), Interim report on the cumulative impact on the global economy of proposed changes in the banking regulatory framework, Technical Report June, Institute of International Finance. 2

International Monetary Fund (2008), Global Financial Stability Report - Containing systemic risks and restoring financial soundness, Technical report. 12

Jacques, K. and Nigro, P. (1997), 'Risk-based capital, portfolio risk, and bank capital : A simultaneous equations approach', *Journal of Economics and Business* **49**(6), 533–547. 6

Kashyap, A. K., Stein, J. C. and Hanson, S. (2010), An analysis of the impact of "substantially heightened" capital requirements on large financial institutions. 9

Kim, D. and Santomero, A. M. (1988), 'Risk in banking and capital regulation', *The Journal of Finance* **43**(5), 1219–1233. 7, 9

King, M. R. (2010), Mapping capital and liquidity requirements to bank lending spreads. 4, 9

Koehn, M. and Santomero, A. M. (1980), 'Regulation of bank capital and portfolio risk', *The Journal of Finance* **35**(5), 1235–1244. 2, 7, 9

Kremp, E. and Piot, C. (2014), 'Le ralentissement du crédit bancaire aux PME en France', *Revue d'économie financière* **114**(Juin), 91–103. 3, 4

Kremp, E. and Sevestre, P. (2013), 'Did the crisis induce credit rationing for French SMEs ?', *Journal of Banking & Finance* **37**(10), 3757–3772. 3, 4, 6, 11, 15

Levieuge, G. (2005), 'Les banques comme vecteurs et amplificateurs des chocs financiers : le canal du capital bancaire', *La Documentation française* **4**(104), 65–95. 2

Levieuge, G. (2015a), Cohérence et contenu prédictif des indicateurs du Bank Lending Survey pour la France. 2, 4

Levieuge, G. (2015b), Explaining and forecasting bank loans. Good times and crisis. 3

Liebig, T., Porath, D., Weder, B. and Wedow, M. (2007), 'Basel II and bank lending to emerging markets : Evidence from the german banking sector', *Journal of Banking & Finance* **31**, 401–418. 2

Macroeconomic Assessment Group (2010), Assessing the macroeconomic impact of the transition to stronger capital and liquidity requirements - Interim report, Technical Report August, Bank for International Settlements. 2

Montoro, C. and Rojas-Suarez, L. (2012), Credit at times of stress : Latin American lessons from the global financial crisis. 16

Myers, S. C. and Majluf, N. S. (1984), Corporate financing and investment decisions when firms have information that investors do not have. 9

OECD (2006), 'The SME financing gap : theory and evidence', *Financial Market Trends* **2006**(2), 89–97. 3

OECD (2007), 'Le financement des PME et des entrepreneurs', *Synthèses* (Février). 3

OECD (2012), *Financing SMEs and entrepreneurs 2012 : an OECD scoreboard*, OECD Publishing. 2, 3

Ogawa, K. and Suzuki, K. (2000), 'Demand for bank loans and investment under borrowing constraints : a panel study of japanese firm data', *Journal of the Japanese and International Economies* **14**(1), 1–21. 4, 6, 11

Peek, J. and Rosengren, E. S. (1995), Small business credit availability : How important is size of lender ? 2, 13

Pessarossi, P. and Weill, L. (2015), 'Les exigences de fonds propres influencent-elles l'efficience des banques ?', *Revue économique* **66**(3), 505–520. 3

Petersen, M. A. (2004), 'Information : Hard and soft'. 5

Petersen, M. A. and Rajan, R. G. (1994), 'The benefits of lending relationships : Evidence from small business data', *The journal of finance* **49**(1), 3. 6

Pons, J.-F. and Quatre, B. (2014), 'L'impact de Bâle III sur les prêts aux PME : L'heure de vérité approche', *Revue d'économie financière* **114**, 233–240. 3

Rameix, G. and Giami, T. (2011), Rapport sur le financement des pme-eti par le marché financier, Technical report. 3

Reisen, H. (2001), Will Basel II contribute to convergence in international capital flows ?, Technical Report May, OECD Development Centre. 2

Repullo, R. and Suarez, J. (2004), 'Loan pricing under Basel capital requirements', *Journal of Financial Intermediation* **13**(4), 496–521. 5

Rochet, J.-C. (1992), 'Capital requirements and the behaviour of commercial banks', *European Economic Review* **36**(5), 1137–1170. 2, 7, 9

Santos, J. A. C. (2000), Bank capital regulation in contemporary banking theory : A review of the literature. 2

Schizas, E. (2011), Framing the debate : Basel III and SMEs, Technical report, The Association of Chartered Certified Accountants. 2, 3

Schizas, E. (2012), Basel III and SMEs : getting the trade-off right, Technical report, The Association of Chartered Certified Accountants. 3

Shin, H. S. (2003), Basel II and bank competition in emerging market economies : Background and recent developments, Technical Report November, London School of Economics. 16

Shrieves, R. E. and Dahl, D. (1992), 'The relationship between risk and capital in commercial banks', *Journal of Banking & Finance* **16**(2), 439–457. 6

Slovik, P. and Cournède, B. (2011), Macroeconomic impact of Basel III. 4, 8

Udell, G. F. (2004), 'SME lending : defining the issues in a global perspective'. 13

Valet, D. (2011), 'Bâle 3 : quel impact sur les modèles bancaires ?', *Variances* **41**, 30–32. 16

Van Gestel, T. and Baesens, B. (2009), *Credit risk management - Basic concepts : financial risk components, rating analysis, models, economic and regulatory capital*, Oxford University Press. 11

Van Gestel, T., Baesens, B., Van Dijcke, P., Suykens, J. A. K., Garcia, J. and Alderweireld, T. (2005), 'Linear and non-linear credit scoring by combining logistic regression and support vector machines', *Journal of Credit Risk* **1**(4), 31–60. 4, 6, 12

Vazquez, F. and Federico, P. (2015), 'Bank funding structures and risk : Evidence from the global financial crisis', *Journal of Banking & Finance* **61**, 1–14. 4, 9, 10, 14, 17, 18, 20, 22

Wooldridge, J. M. (2002), *Econometric analysis of cross section and panel data*, The MIT Press. 7

Zellner, A. and Theil, H. (1962), 'Three-stage least squares : Simultaneous estimation of simultaneous equations', *Econometrica* **30**(1), 54–78. 4