FSB FINANCIAL STABILITY BOARD

Evaluation of the effects of financial regulatory reforms on small and medium-sized enterprise (SME) financing

Technical Appendix to the empirical analysis

7 June 2019

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Background

In the aftermath of the financial crisis, the G20 launched a comprehensive programme of financial reforms to increase the resilience of the global financial system, while preserving its open and integrated structure. The FSB, in close collaboration with the standard-setting bodies and informed by work carried out by its members and other stakeholders, has developed a framework for the post-implementation evaluation of the effects of the G20 financial regulatory reforms (Framework).[1] One of the first two evaluations under the Framework is an examination of the effects of the G20 regulatory reforms on financial intermediation.[2] The evaluation consists of two parts: the first part involved an evaluation of the effects of reforms on the financing of infrastructure investment (delivered to the Argentine G20 Summit in November 2018);[3] and the second part involves an evaluation of the effects of reforms on the financing of small and medium-sized enterprises (for delivery to the Japanese G20 Presidency in 2019). The motivation for this evaluation stems from the need to better understand the effects of the post-crisis reforms on the financing of real economic activity and their contribution to the G20 objective of strong, sustainable, balanced and inclusive economic growth.

This Technical Appendix complements the evaluation report that focuses on the effects of reforms on the financing of small and medium-sized enterprises (SMEs) by providing a detailed description of the analytical approaches, data sources and results of the empirical analysis.

1. Introduction to the empirical approaches

What is the impact of the G20 regulatory reforms on SMEs' financing, and their business in general? This note lays out the empirical procedures and preliminary findings to examine this question with a particular focus on the Basel III reforms. The main objective of these Basel III financial reforms has been to increase the resilience of financial intermediaries and the financial system as a whole.[4] Banks were at the centre of the reforms. However, in their role as financial intermediaries, banks might have passed on the impact of regulatory changes to their customers like small- and medium-sized enterprises (SMEs).

Small- and medium-sized enterprises (SMEs) form the economic backbone of many developed and developing countries. As of 2017, SMEs accounted for about 60% of total employment in OECD countries, and more than half of their value added.[5] The extent to which SMEs could have felt the consequences of reforms depends not only on their own financial conditions as more or less creditworthy borrowers, but also on banks' willingness and capacity to lend. More resilient banks with higher capital buffers, for example, might be more willing to

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1 *Framework for Post-implementation Evaluation of the Effects of the G20 Financial Reforms* (July 2017).

2 The other initial evaluation under the Framework examined the effects of post-crisis reforms on *incentives to centrally clear OTC derivatives* (November 2018).

3 *Evaluation of the effects of financial regulatory reforms on infrastructure finance* (November 2018).

4 See FSB 2016, Progress report to the G20

5 See http://www.oecd.org/industry/financing-smes-and-entrepreneurs-23065265.htm

continue accommodating the financial needs of their SME customers after the reforms entered into force.

The following core questions guide the different pieces of the analysis. Did the SME lending of the most affected banks slow in the aftermath of the Basel III reforms (Q1)? Did the reforms have a stronger effect on the financing of SMEs relative to that of larger, non-financial companies (Q2)? Did the terms of SME financing -- like maturity, collateral requirements and costs (interest rates) -- tighten after reform implementation (Q3)? Did the allocation of SME credit change across banks or firms after the reforms came into effect (Q4)?

This study draws on 15 different datasets to shed light on these questions from two different angles--from a bird's eye view, and from a grassroots perspective. First, from a bird's eye view, a host of *cross-country* analyses compare different jurisdictions within one analysis. The underlying datasets range from broad survey aggregates to individual bank and firm balance sheets. Second, from a grassroots perspective, *individual FSB member jurisdictions* act as satellites conducting country-specific analyses while following a common analytical protocol. Their analyses draw on confidential datasets like credit registers at the bank-firm level, or supervisory bank-level reports on balance sheets and income statements.

Econometric identification is key to isolate the impact of regulatory reforms. Appropriate econometric strategies paired with the most granular data available not only give way to a proper econometric identification, but they also provide the most insightful analytical results. The analyses exploit *cross-sectional heterogeneity* at the country, bank and SME borrower level as a key identification device. Further, credit register data at the level of individual bank-firm relationships allow for a separation of demand and supply effects. Using such granular data and controlling for demand, can help identify the *relative* effects of reforms. As aggregate SME lending in the post reform implementation period might be confounded with other macroeconomic drivers like monetary policy, for instance, the *absolute* effects, however, cannot be identified.

Overall, results do not reveal a "one-size-fits-all pattern" – reality is more complex and nuanced. The main conclusion of the evaluation is that, for the reforms in scope, the analysis thus far does not identify material and persistent negative effects on SME financing in general, although there is some differentiation across jurisdictions. There is some evidence that the more stringent risk-based capital (RBC) requirements under Basel III slowed the pace of SME lending growth at the most "affected" banks (i.e. those least capitalised ex ante) relative to other banks (Q1). Some jurisdictions also exhibit tighter credit conditions in the post-reform period (Q3). These effects are not homogeneous across jurisdictions and they are generally found to be temporary. This conclusion, which is subject to additional analysis, is consistent with the literature on the effects of bank capital regulations and with stakeholder feedback that SME financing is largely driven by factors other than financial regulation. Results obtained at the individual bank level point to a drop in the share of SME over total corporate lending for the most exposed banks (Q2). Cross-sectional analyses based on firm and bank firm-level data find some reallocation of lending towards more creditworthy SMEs and improved access to finance for financially stronger SMEs. For, instance, the cross-sectional Capital IQ analysis suggests that, after the reforms were introduced, better capitalised and more profitable firms increased their long-term borrowing and investments relatively more than other firms (Q4). The ECB's analysis confirms this pattern based on their SAFE survey data. This is consistent with

preliminary evidence of a credit reallocation by banks towards more creditworthy borrowers shown by some within-country studies, although this reallocation is not specific to SMEs.

The remainder of this section sets the stage for the different pieces of the analysis. First, it presents the various datasets that enter the overall evaluation and explains how they can shed light on SME financing from different angles. It then describes the different implementation stages of the considered Basel III reforms and illustrates their potential temporary or persistent impact. The last part of this section elaborates on the challenges that this evaluation faces when trying to provide empirically founded answers to the four guiding questions.

Section 2 presents all cross-country studies, starting with the most aggregate FSB survey data analysis and proceeds to a firm-level analysis based on commercial data provided by Capital IQ. It then turns to the individual firm- and bank-level analyses conducted by the BCBS and the ECB on their proprietary data.

Section 3 describes the common research protocol for the within-country studies and compares their results. The first part presents six analyses based on bank-firm level data that examine the effect of tighter capital requirements on the pace of SME lending growth. The second part compares the effects on lending growth and portfolio shares at the level of individual banks. As of now, this section covers only results on RBC reforms. Detailed parallel analyses on other reforms are currently being conducted for the final report and technical appendix.

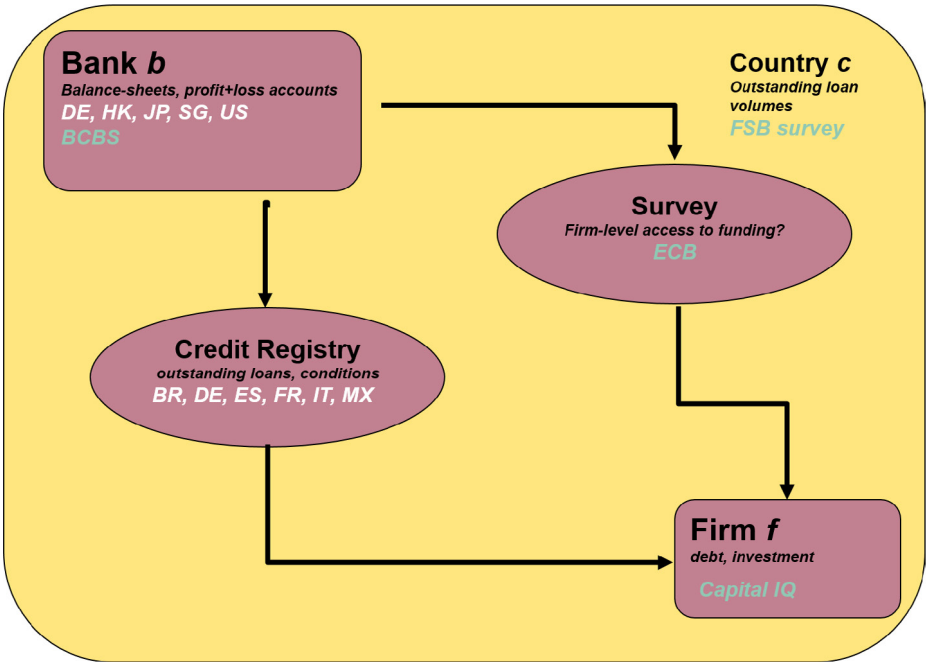
1.1 Datasets that reflect two different angles

This evaluation examines SME financing from two different angles, from a bird's eye view and from a grassroots perspective. The datasets that enter the various pieces of the empirical analysis differ in terms of their coverage and granularity. Importantly, both granularity and coverage shape the set of analytical options needed to properly identify the reform effects. The spectrum of data granularity ranges from outstanding lending volumes split by maturity for each *bank-firm relationship*, to *individual* accounts (balance sheets, financial statements) filed by *banks* and *firms*, and ultimately to the aggregated level of macroeconomic time series on SME financing for individual *jurisdictions*. In terms of coverage, datasets either capture various entities in one jurisdiction (*within country analysis*) or multiple jurisdictions (*cross-country analyses*) over time.

Complementary pieces of the overall evaluation draw on a rich variety of cross-country and jurisdiction-specific data sets. Figure 1 shows all multinational datasets that enter the cross-country analyses in green, while all national studies are described with white two-letter country codes. At the national level, satellite teams in Brazil, Germany, Spain, France, Italy and Mexico use their credit register data to conduct the most granular analyses at the individual bank-firm relationships. Satellite teams in Germany, Hong Kong, Japan, Singapore and the United States explore bank-level datasets. At the multinational level, the ECB uses firm-level survey data from various euro area countries to examine whether firms feel constrained in their access to bank funding. The BCBS draws on supervisory bank-level reports submitted by member countries to shed light on extended SME loan volumes and the individual bank's compliance with current and future regulatory standards. Another multinational exercise uses firm-level data from Capital IQ, a commercial data provider, to analyse corporate balance sheets and track the reform effect to real economic outcomes. Finally, the FSB has conducted a survey

among its member jurisdictions on aggregate outstanding credit volumes to SMEs and other corporates that enters the most aggregate, cross-country analysis from a bird's eye perspective.

15 Datasets that enter the empirical analysis Figure 1



1.2 Basel III reforms and their implementation stages

The overall evaluation focuses on two distinct implementation stages of five Basel III reforms: national announcement and legal framework. Based on comments from industry participants, academia, stakeholders interviewed in various FSB jurisdictions, and authorities answering the FSB survey, it was found that the internationally agreed reforms that may impact on SME finance are:

- RBC: Risk based capital ratio
- G-SIB/D-SIB framework
- LCR: Liquidity coverage ratio
- LR: Leverage ratio
- NSFR: Net stable funding ratio

This selection of reforms is also consistent with last years' FSB evaluation of the reforms' effects on infrastructure financing[6]. In what follows the NSFR reforms are not considered as they have been only announced later and its announcement and implementation are too recent to yield reliable econometric results.

[6] The full report is available on the FSB website. [LINK]

This analysis draws on the national *announcement* and *legal framework* implementation as key stages at the national level. The general announcement of the Basel III reform package took place in December 2010. Beyond this, the BCBS' RCAP implementation assessment[7] features four subsequent implementation steps that take place at the national level. This data on national implementation was collected for the first time in Q3 2011 with the first reference date of June 2011.

Table 1

Basel III implementation stages

Value	Definition
1	**Draft regulation not published:** no draft law, regulation or other official document has been made public to detail the planned content of the domestic regulatory rules. This status includes cases where a jurisdiction has communicated high-level information about its implementation plans but not detailed rules.
2	**Draft regulation published:** a draft law, regulation or other official document is already publicly available, for example for public consultation or legislative deliberations. The content of the document has to be specific enough to be implemented when adopted.
3	**Final rule published:** the domestic legal or regulatory framework has been finalised and approved but is still not implemented by banks.
4	**Final rule in force:** the domestic legal and regulatory framework has been published and is implemented by banks.

Source: BCBS

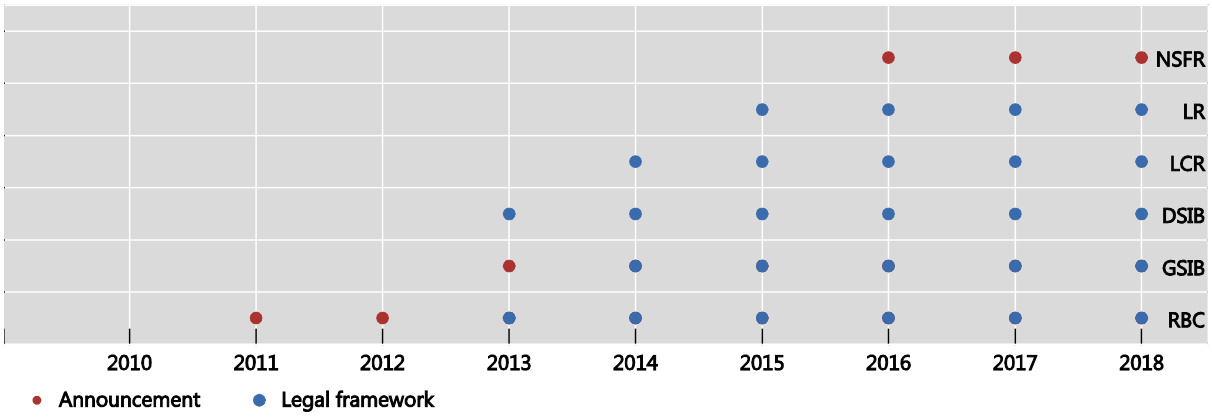
From this list, this evaluation selects two distinct implementation stages, namely the national **announcement** (stage 2 in the above table) and the publication of the national **legal framework** (stage 3 of the above table.).

This evaluation aims to pick up the impact of the reforms in two different ways. First, there might be a *temporary* impact on banks' willingness to extend new lending to SMEs. Accordingly, this evaluation draws on the *growth rate of SME lending* to capture changes in the outstanding levels of SME financing. To map the *temporary* impact into the estimation framework, the evaluation uses a set of on/off dummy variables that individually assume the value of one for one particular period in the post-reform period, and zero otherwise. For each on/off dummy variable, this analysis estimates a specific coefficient. It hereby allows the effect to evolve over time--e.g. fade out, or gain in strength over the post-reform period. Apart from the individual coefficient estimates, this evaluation considers the sum of all on-off estimates to assess whether there was a significant effect of the reform. Figure 2 illustrates this *temporary* impact of reforms for EU countries with individual dots for each on-off dummy. A red dot refers to the national announcement, a blue dot to the legal framework.

[7] The report is based on information provided by individual members as part of the Committee's Regulatory Consistency Assessment Programme (RCAP) and available on the BCBS's website: https://www.bis.org/bcbs/publ/d452.htm.

$\sum_{k=0}^{T} Reg_{t-k}^{temp}$	Sum of on/off regulation dummies, ranging from the contemporaneous (k=0) period until the end of the sample T.
$RegA_t^{pers}, RegL_t^{pers}$	Persistent dummy for the announcement (A) and legal framework (L) as stages of implementation, respectively.

Risk-based capital ratio (RBC) implementation stages: European Union Figure 2

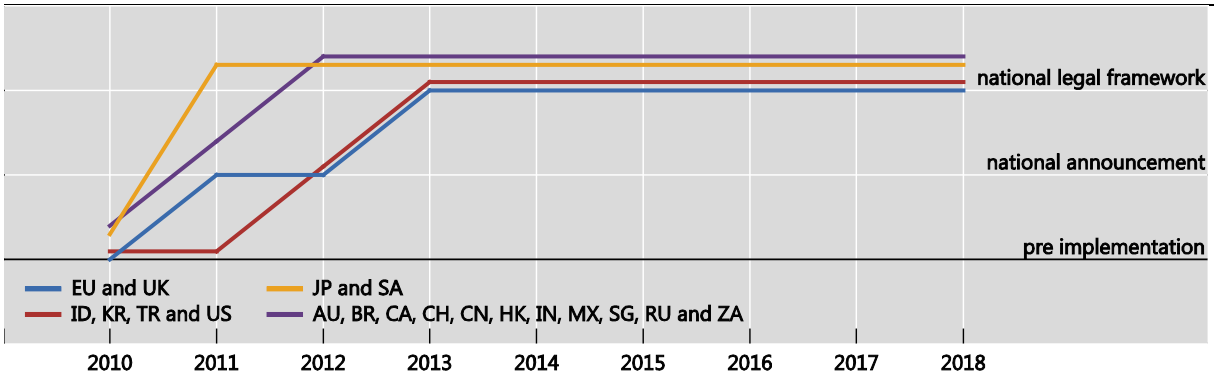


Note: This figure shows two of the national implementation stages as described in the BCBS' RCAP implementation assessment. The link to the underlying public reports is: https://www.bis.org/bcbs/publ/d452.htm.

Source: BCBS

Second, there might be a *persistent* effect on new SME credit extension or on the composition of banks' SME loan portfolios. To map this persistent effect into the analysis, this evaluation uses one dummy variable that assumes the value of one over the entire post-reform period. As this procedure restricts the coefficient to be the same across periods, the persistent effect could be thought of as an average effect on either growth rates or shares of SME portfolio components. Figure 3 illustrates this persistent effect for a few jurisdictions. In the particular case of the RBC reform, it is possible to distinguish between two distinct implementation stages. For this reason, this evaluation allows both stages to have a persistent impact and hence lets both persistent dummies enter the respective empirical specification. Besides their individual significance, the econometric analysis uses an F-test to evaluate the joint significance of both steps.

Risk-based capital ratio (RBC) implementation stages: FSB jurisdictions Figure 3



Note: This figure presents two of the national implementation stages as described in the BCBS' RCAP implementation assessment. The link to the underlying public reports is: https://www.bis.org/bcbs/publ/d452.htm.

Source: BCBS

The main conclusions rest on the RBC reform results for several reasons. First, the RBC reform initiated the sequence of Basel III regulations. Banks might have significantly increased their capital ratios to comply with higher RBC requirements relatively early over the 2011 to 2018 period. In order to meet additional requirements induced by other capital-related reforms, like the LR and G-SIB, later, little additional adjustments might have been necessary to comply. Second, before liquidity-related reforms had been announced, several jurisdictions already had in place similar regulations which might have also reduced the additional adjustments needed to comply with the LCR.

1.3 Identification is a challenge

Cross-sectional heterogeneity and data granularity serve as the key identification devices. To properly identify the reform effects, individual empirical analyses must meet a twofold challenge. First, they must be able to *separate bank supply* from SME-side *demand* effects. Second, they must be able to *isolate reform effects* from other, potentially confounding developments. The core questions that guide the empirical analyses are listed below. Table 2 summarises how the individual studies can address these questions based on their coverage, data structure and identification strategies either from cross-country or from a single country perspective.

To separate supply and demand factors, this evaluation lets control variables, fixed effects or an appropriate combination of both absorb the demand side. Table 2 shows that the specific handling depends on the perspective, data structure and granularity of the respective analyses. At the *most aggregate* level, the FSB survey analysis combines macroeconomic control variables with separate country and time fixed effects to control for distorting demand effects. At the *most granular* bank-firm relationship level, fixed effects at the sector-by-time level absorb sector-specific demand effects that vary over time, while bank-firm fixed effects soak up any time-invariant aspects that are unique to a particular bank-customer relationship. Figure 4 illustrates this identification strategy. If two banks are differently affected by the reforms, absorbing any demand effect that is customer-specific means that any different lending outcomes can be attributed to the reforms.

Q1: SME lending by the most affected banks

- Did the relatively more affected banks cut their SME lending in response to the reforms compared to other banks?
- Did those banks reduce their SME loan issuance only temporarily, or persistently over the entire post reform period?

Q2: SME vs large firms

- Did the reform effects play out stronger for lending to SMEs than for lending to large non-financial companies?

Q3: Terms and conditions of SME lending

- Did more affected banks re-structure their SME loan portfolio towards longer or shorter maturities?
- Did more affected banks require more *collateral* after reform implementation?
- Did the *costs* of SME financing change?

Q4: Reallocation effects

- Did the composition of borrowing SMEs change over time, e.g. in that relatively more credit was extended to more creditworthy borrowers?

Table 2

Key dimensions and identification tools of the empirical analyses

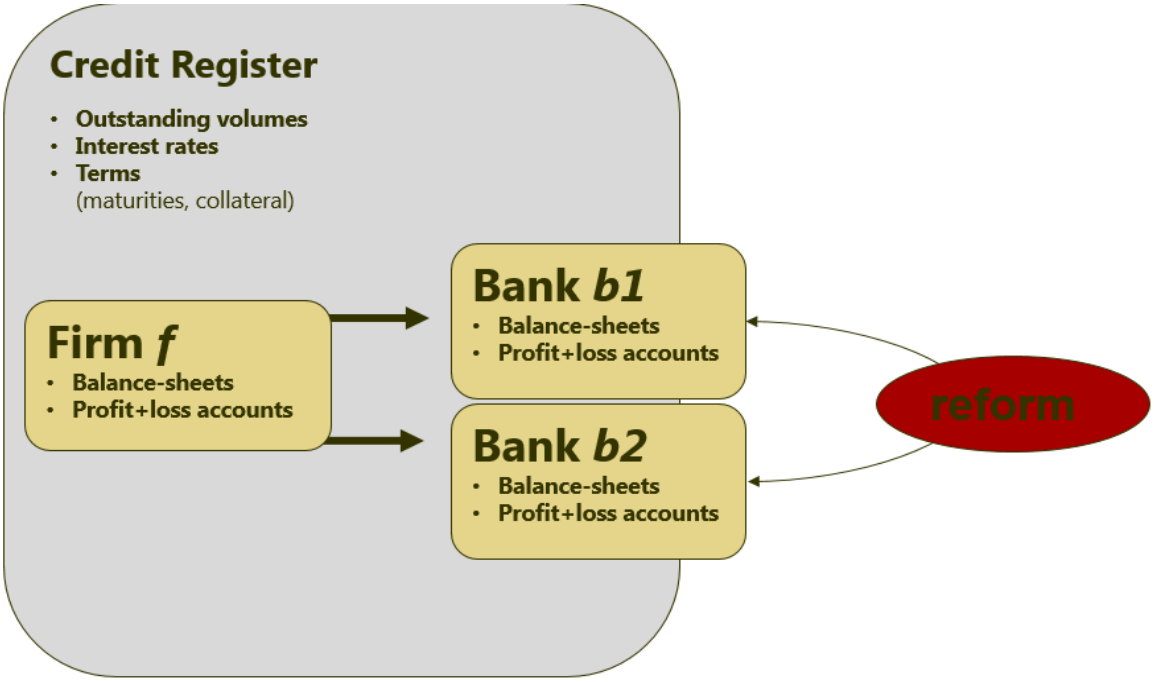
	Coverage of the estimation sample	Unit of observation	SME outcome variable of interest	Demand absorbed by	Heterogeneity to proxy reform exposure
Cross-country analyses					
FSB survey	13 AEs+ 8 EMDEs 2010-2017	Country-time	Aggregate bank lending to SMEs	Macro control variables at the country-time level Separate country and time fixed effects.	Banking system characteristics at the country-time level
Capital IQ	9 AEs+EMDEs 2010-2017	Firm-time	SME debt (total, short term, long term) and investment	Country-by-time fixed effects and firm fixed effects.	Time-varying firm characteristics. Flesh out most affected firms within each country.
ECB SAFE survey	8 euro area members 2010-2016	Firm-time Bank-firm time	SMEs reply being "credit-constrained"	Firm-level control variables and fixed effects (country-by-time or separate country and time).	Time-invariant bank characteristics. Flesh out most affected banks at the euro area level.
BCBS	18 AE+EMDE members 2011-2018	Bank-time	Individual banks' SME loan portfolio	Macroeconomic control variables	At the individual lending bank's exposure to the reforms. Flesh out particularly affected banks at the country level.

Individual country analyses				
Supervisory bank reports[8]	Bank-time	Individual banks' SME loan portfolio (total, long term, short term)	Macroeconomic control variables, bank and time fixed effects or bank and region-by-time fixed effects	Individual lending bank's exposure to the reforms
Credit registers	Bank-firm-time	Bank-firm loan relationships (total, short term, long term, collateralised, indicative or charged interest rates)	bank-by-firm fixed effects, and sector-by-time fixed effects	Individual lending bank's exposure to the reforms

[8] One within-country analysis used commercial data.

Identification strategy

Reforms differentially affect banks that show heterogeneous ex-ante exposures. Figure 4



With respect to credit register analyses, firms might have single or multiple customer relationship with banks. To accommodate those single customer relationships that are more prevalent in emerging markets, the common research protocol suggests to use sector-by-time fixed effects in order to absorb time-varying demand effects. With respect to balance sheet analyses at the bank level, identification exploits the differential bank exposures and draws on macroeconomic variables and time fixed effects to absorb the demand side.

Source: Authors' illustration

To identify the reform effects, this evaluation exploits banks' exposure measures to the reforms at different levels. The more granular analyses performed by *individual* countries draw on bank-level exposures to the reform. To flesh out particularly affected banks, their analysis ranks banks by their exposure measure in the pre-reform period and lets a dummy variable indicate whether a particular bank belonged to the group in the lowest quartile (p25) of the national bank population.

Cross-country studies follow a similar approach. Based on individual bank data, the BCBS analysis ranks banks across countries using the entire cross section. The ECB explores both types of rankings, highlighting particularly exposed banks within and across countries. As the FSB survey analyses draws on country-level data and banking system characteristics, it can only flesh out particularly affected countries ranking banking systems across all countries. Finally, the Capital IQ constructs proxies of firm-level creditworthiness to highlight particular firms among their competitors within each country. The underlying assumption is that, if more exposed banks pass on the regulation effect to their customers, less creditworthy borrowers will be relatively more affected.

Except for the G-SIB/D-SIB regulation, the definition of key characteristics that separate relatively more from relatively less-exposed banks is essential as a proper control group of banks that is unaffected by the Basel III reform does not exist. The set of investigated

Basel III reforms can be separated into capital and liquidity related reforms. For all bank-level studies, reform-specific balance sheet measures help to disentangle the effects of different reforms. For instance, Table 3 shows that, to analyse the effects of the RBC reform, the analysis resorts to the ratio of Tier 1 capital over risk-weighted assets.

Table 3

Exposure measures addressing individual Basel III reforms

Reform	$\boldsymbol{Bank(0/1)_{b,pre}}$ **exposure variable based on**
RBC	Tier1 capital*/RWA
LCR	(Cash + central bank accounts + liquid securities)/TA
G-SIB/D-SIB	Bank assigned as D-SIB or G-SIB
LR	Tier1 capital*/Total Assets

*Note: Some countries use CET1 instead of Tier1 if the data coverage is better.

Despite applying the presented identification strategies, the following caveats apply. Importantly, there is no natural control group of totally unaffected entities. Usually, Basel III reforms apply to all banks in a jurisdiction[9] which rules out a simplistic, textbook-like difference-in-difference approach. We address this concern by fleshing out those banks that had been particularly affected by the reforms according to their pre-reform exposure and compare them to relatively less-affected banks. For this reason, it is impossible to pin down an "absolute" reform effect as post-reform trends mingle bank adjustments with other economic phenomena to which banks respond differently. The empirical analysis can only identify relative effects. Put differently, an insignificant effect for the more exposed banks only indicates that their response was not significantly different from the response of the rest of the banking population.

[9] In Japan and the US, not all Basel III reforms applied to all banks. Individual satellite analyses take this into account.

2. Cross-country studies

From a bird's-eye point of view, four cross-country studies analyse the impact of reforms on SME finance. They draw on multinational data at the country-level (FSB survey), the firm-level (Capital IQ); the bank-level (BCBS), and most granular, at the firm-by-bank-level (ECB), to identify the reform effects. The breadth (number of jurisdictions) and depth (granularity of information) of these studies vary widely and, taken together, they provide a broad view on SME finance that complements the evidence found in single-country analyses.

2.1 Analysis based on FSB aggregated survey data

For the purpose of this evaluation exercise, a unique dataset on SME financing in 24 jurisdictions has been created[10]. The FSB asked member jurisdictions to provide data on national SME financing characteristics, trends, and drivers. Authorities shared this information based on the SME definition that prevails in their respective jurisdiction. The empirical strategy adopted can handle these systematic difference in coverage and characteristics as long as they are either time-invariant, or correlated with other macroeconomic control variables.

By pooling data from FSB members, this analysis exploits country-level heterogeneity along several dimensions. It exploits heterogeneity in the implementation of reforms, in banking-system characteristics and in macroeconomic and financial conditions to identify the impact on SME financing. More specifically, this dataset allows the analysis to shed light on SMEs' access to financing, the maturity structure of their borrowing and prices. Thereby, it complements the analysis of jurisdiction-specific studies.

2.1.1 Data description

The FSB Survey contains annual data for 24 jurisdictions over the 2000-17 period. It describes aggregate bank lending to SMEs with breakdowns by different maturities, average interest rates and also captures information on total corporate lending.

The FSB dataset is complemented with data on macroeconomic developments and banking system characteristics for each jurisdiction. Specifically, nominal effective exchange rates (NEER) and credit-to-GDP gaps are obtained from the BIS, real GDP growth rates from the IMF-WEO, and aggregate banking system characteristics from the CGFS.[11] For countries not included in the CGFS dataset, jurisdiction-level aggregates have been constructed based on bank-level data from the commercial provider SNL-S&P.

After taking heterogeneous reporting practices and data gaps into account, a panel with data for up to 22 jurisdictions that ranges from 2010-17 enters the empirical analysis[12] (see Table 4).

2.1.2 Adjustments and data cleaning procedure

The variable which is reported by most jurisdictions is the total of "outstanding bank loans to SMEs" (Table 4). For a subset of countries, it is possible to separate short-term from long-term

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[10] Ultimately, two countries (CN and SA) had to be dropped as no corresponding banking system control variables seemed to be available.

[11] CGFS (2018). "Structural changes in banking after the crisis dataset."

[12] This in an unbalanced panel since not all jurisdictions have information on dependent and control variables in every year.

lending, and to examine other measures of SME financing at the aggregate country level. The empirical analysis below focuses on the full sample of jurisdictions that reported on SME lending. It then looks at a subset of 12 jurisdictions[13] featuring both advanced economies (8 jurisdictions) and emerging markets (4 jurisdictions) that reported the short-term and long-term split (the balanced sample). Restricting the sample allows to analyse how the different tenors of SME lending have changed for the set of jurisdictions that provide this data.

Variables have been winsorised at the 5% level in each tail in order to reduce the sensitivity of the regressions to outliers. Nominal amounts were converted into constant US dollars before computing the national growth rates of various SME lending aggregates.

Table 4

FSB survey jurisdictions that enter the analysis

Number of countries	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Total SME lending	20	21	22	23	24	24	23	21
Total corporate lending	20	21	21	21	22	22	21	19
Short-term SME lending	9	11	10	11	12	12	11	10
Long-term SME lending	9	11	10	11	12	12	11	10
Interest rate-SMEs	14	15	15	16	17	17	18	17
Interest rate-large firms	13	14	14	14	15	15	15	14

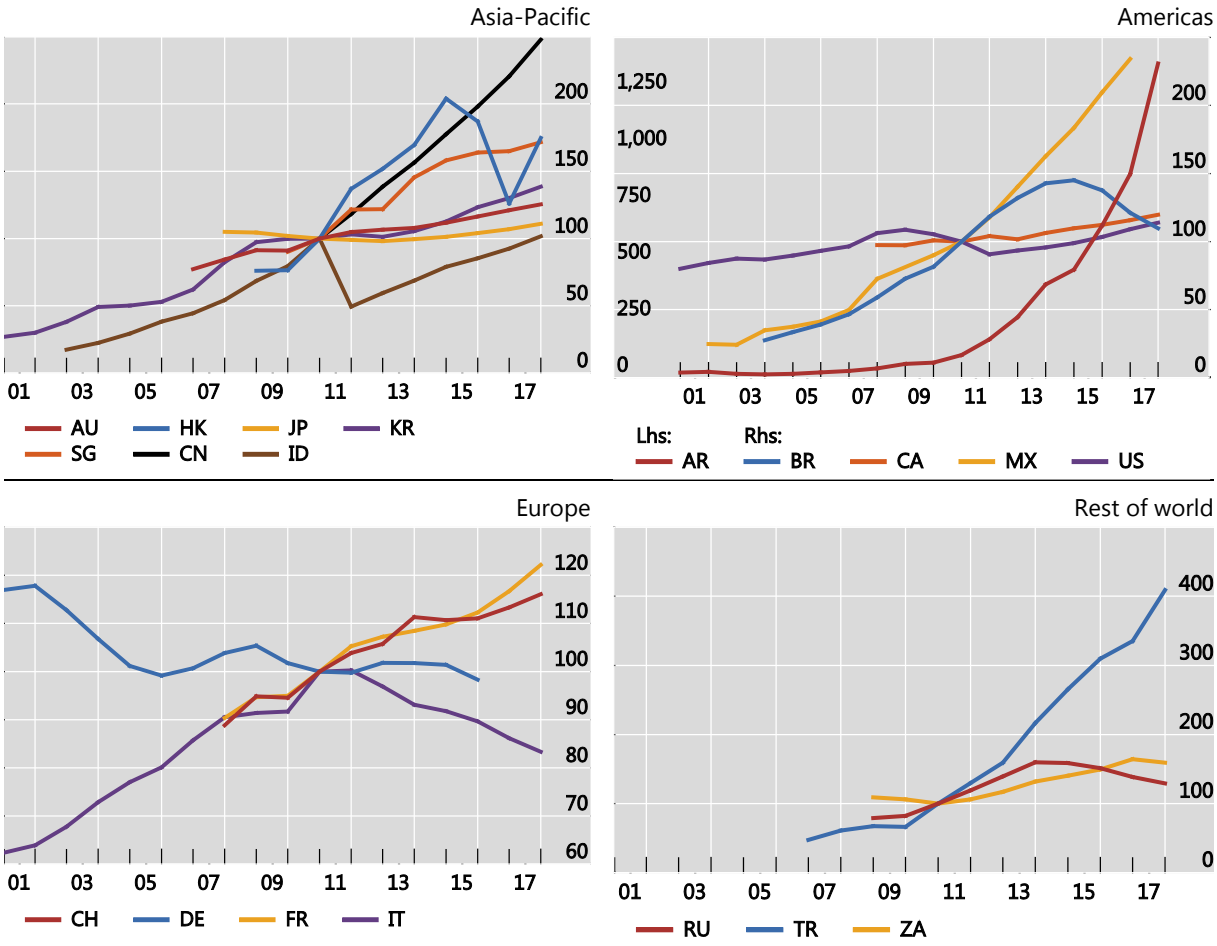
For most countries, Figure 5 suggests an increase in the total amount of outstanding SME bank lending between 2002 and 2017. This statement holds across most advanced and developing countries with the exceptions of Italy and Germany in Europe, for instance. However, when considering SME lending as a share of banks' total corporate loan portfolios (Figure 6), most countries in Europe and Asia-Pacific exhibit constant or slightly declining ratios, while jurisdictions in the Americas show more divergent patterns.

SME lending rates have followed the overall decline in interest rates in most jurisdictions, although they remain consistently above the corresponding rates for larger firms. For a more detailed description of the trends, see section 2 of the consultation report (see Graphs 4 and 5 in the consultation report).

[13] Not all 21 jurisdictions enter each analysis. Advanced economies (AU, CA, CH, DE, ES, FR, HK, IT, JP, KR, NL, SG, UK and US); emerging markets and developing economies (AR, BR, ID, IN, MX, RU, TR, ZA). The 12 countries that provided maturity breakdowns are: 4 EMDEs (AR, BR, ID, MX) and 8 AE (DE, ES, FR, IT, JP, KR, NL, SG).

Outstanding bank loans to SMEs

By region, index 2010=100 Figure 5



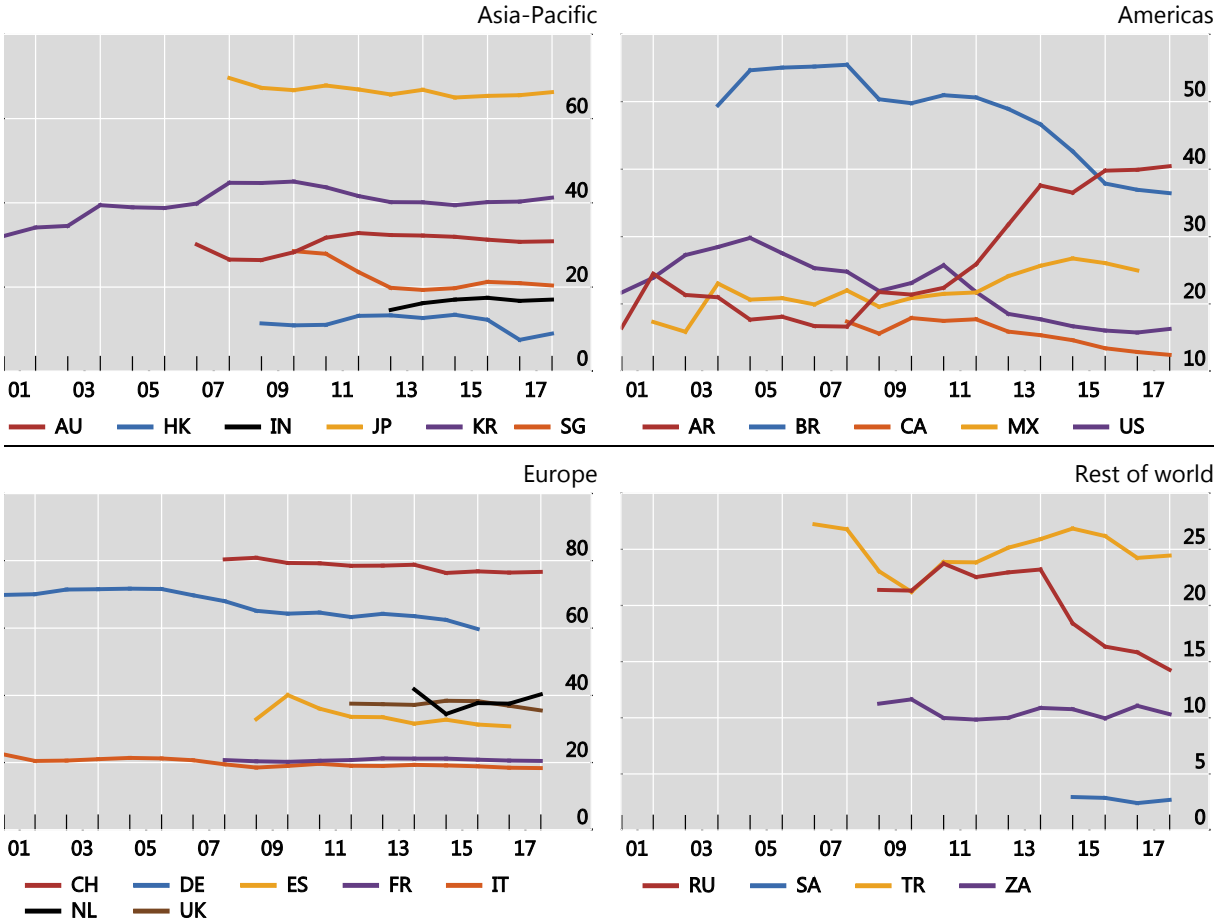
Note: For IT, the SME aggregate refers to bank loans to firms with <20 employees.

Source: FSB questionnaire on SME financing.

Total bank business loans SME/total bank business loans by region

By region, in percent

Figure 6



Note: For IT, the SME aggregate refers to bank loans to firms with <20 employees.

Source: FSB questionnaire on SME financing.

2.1.3 Empirical specification

Identification challenges are mitigated by exploiting heterogeneity in the reforms' national implementation schedules and differential exposures to these reforms at the jurisdiction level. Equations (FSB 1) to (FSB 3) allow for the possibility of reforms having either temporary or persistent effect on SME financing, while comparing jurisdictions classified a priori as more exposed to the reforms relative to less exposed jurisdictions.

$$\Delta y_{c,t} = \gamma_B C\_Bank_{c,t-1} + \gamma_C C\_Econ_{c,t-1} + \sum_{k=0}^{2}\left(\beta_{Rk}^{A} RegA_{c,t-k}^{temp}\right) + \sum_{k=0}^{2}\left(\beta_{RBk}^{A} RegA_{c,t-k}^{temp} * Bank(0/1)_{c,pre}\right) + FE(c,\ t) + \varepsilon_{c,t} \qquad \text{(FSB 1)}$$

$\Delta y_{c,t}$	Δ% of total, short-term and long-term SME lending, total corporate lending
$Bank(0/1)_{c,pre}$	Indicator of banking system *c*'s pre-reform average exposure measure is **≤ p50**
$C\_Bank_{c,t-1}$	Banking system control variables: bank assets/GDP, liquidity, deposit, capitalization and internationalisation ratio
$C\_Econ_{c,t-1}$	BIS financial cycle and real GDP growth
$RegA_{c,t-k}^{temp}$	On/off reform announcement indicator for lagged period *t-k*
$FE(c,t)$	Separate country and time fixed effects

In specification (FSB 1), the analysis estimates the effect of regulation on the growth rate of total, short-term and long-term SME lending by banks. To contrast SME lending with total corporate lending, the analysis also explores the reform effects on the growth rate of corporate bank lending (i.e., credit to both SMEs and large firms). Macroeconomic and financial control variables are used to absorb distorting demand effects in each jurisdiction (by using, for instance, the BIS financial cycle measured by the credit-to-GDP and real GDP growth rates), and to control for other banking-system characteristics (bank assets to GDP, aggregate liquidity and international operations of banks). Separate country and time fixed effects pick up time-invariant country specificities and global trends.[14] All results are reported using robust standard errors clustered by jurisdiction.

By fleshing out the temporary effects of regulation, the coefficients of interest are β_{rbk}^{A} (*k=0, 1, 2*) compare the more exposed banking systems with less exposed banking systems. These coefficients are associated with the interaction of two indicator variables: $RegA_{c,t-k}^{temp}$ and $Bank(0/1)_{c,pre}$ that refer to the current announcement period plus lags to highlight jurisdictions that are supposed to be more exposed to the regulation as illustrated in Figure 2.

For example, in the case of risk-based capital reforms, $Bank(0/1)_{c,pre}$identifies the most exposed jurisdictions as those with an <u>average aggregate</u> Tier 1 capitalization ratio during the pre-announcement period that is below the median.[15]

To investigate persistent effects, specification (FSB 2) introduces a set of two persistent dummy variables indicating the national announcement ($RegA_{c,t}^{pers}$) and the publication of the national legal framework ($RegL_{c,t}^{pers}$).[16] Figure 2 illustrates these persistent effects for a set of countries. As relevant outcome variables, specification (FSB 2) considers the relative importance of SME lending (as a share of total credit), the maturity structure of SME lending (long-term lending as

[14] This precludes us from including the exposed banking system indicator on a standalone basis.

[15] This aggregate capitalisation ratio (tier 1 capital / risk weighted assets) is equivalent to computing the weighted average capitalisation ratio of all banks within a jurisdiction, where the weight for each bank is given by its share of aggregate risk weighted assets. This analysis used p50 as it could only draw on a sample of only up to 22 entities.

[16] It is not always possible to include both dummies in all analyses. In some cases, there is no variation in announcement and publication of legal framework within the sample of jurisdictions that have the necessary data to estimate equations (FSB 2) or (FSB 3).

a share of total SME credit), and the spread of interest rate charged on SMEs relative to large firms.

$$y_{c,t} = \gamma_B C\_Bank_{c,t-1} + \gamma_C C\_Econ_{c,t-1} + \left(\beta_R^A RegA_{c,t}^{pers} + \beta_R^L RegL_{c,t}^{pers}\right) + \left(\beta_{RB}^A RegA_{c,t}^{pers} + \beta_{RB}^L RegL_{c,t}^{pers}\right) * Bank(0/1)_{c,pre} + FE(c,\ t) + \varepsilon_{c,t} \quad \text{(FSB 2)}$$

$y_{c,t}$	Share of (i) total SME over corporate lending, (ii) long-term over total SME lending
	Spread of interest rate on SME and large firm lending
$Bank(0/1)_{c,pre}$	Indicator of banking system *c*'s pre-reform average exposure measure is **≤ p50**
$C\_Bank_{c,t-1}$	Banking system control variables: bank assets/GDP, liquidity, deposit, capitalization and internationalisation ratio
$C\_Econ_{c,t-1}$	BIS financial cycle and real GDP growth
$RegA_{c,t}^{pers}$	Persistent reform announcement indicator
$RegL_{c,t}^{pers}$	Persistent legal framework indicator
$FE(c,t)$	Country and time fixed effects

Finally, specification (FSB 3) draws on (FSB 1), but examines whether there was a *persistent* regulation effect on the growth rate of total, short-term and long-term SME lending. Furthermore, it compares SME lending with the growth rate of corporate bank lending.

$$\Delta y_{c,t} = \gamma_B C\_Bank_{c,t-1} + \gamma_E C\_Econ_{c,t-1} + \left(\beta_R^A RegA_{c,t}^{pers} + \beta_R^L RegL_{c,t}^{pers}\right) + \left(\beta_{RB}^A RegA_{c,t}^{pers} + \beta_{RB}^L RegL_{c,t}^{pers}\right) * Bank(0/1)_{c,pre} + FE(c,\ t) + \varepsilon_{c,t} \quad \text{(FSB 3)}$$

To complement other analyses, this survey data contribution also focuses on the four core Basel III reforms, but it resorts to slightly different exposure measures. As described in Table 5, the analysis uses *aggregate* measures of liquidity, leverage, or the market share of the largest banks. In all cases, except for the G-SIB/D-SIB framework, countries whose aggregate average indicator before the reform announcement was less than or equal to the median are considered as most-exposed countries. In the case of G-SIBs or D-SIBs, countries have been classified as most-exposed countries in which the largest five banks had an average market share before the announcement that was higher than 60 percent. The underlying assumption is that these countries are most likely to be affected by the G-SIB or D-SIB regulation than countries with less concentrated banking systems.

Table 5

Reform and exposure indicators

Reform	**Exposure measures** $\boldsymbol{Bank(0/1)_{c,pre}}$ **capturing:**	**Regulation dummies** $(\boldsymbol{RegA_{c,t}^{pers}}, \boldsymbol{RegL_{c,t}^{pers}})$
RBC	Tier1 capital/Risk Weighted Assets	
G-SIB/D-SIB	Bank Concentration Ratio (CR5)	Overlaps in some jurisdictions
LCR	(Cash + central bank accounts + liquid securities)/Assets	Overlaps in some jurisdictions
LR	Tier1 capital/Assets	

Table 6

Descriptive statistics

	Mean	**SD**	**Min**	**p50**	**Max**	**n**	**Countries**
Dependent variables							
ΔTotal SME lending	7.0	13.9	-16.9	5.6	37.7	163	22
ΔTotal corporate lending	7.5	12.7	-13.8	6.7	33.7	162	21
ΔShort-term SME lending	2.1	15.8	-37.9	3.7	30.9	79	12
ΔLong-term SME lending	7.3	15.1	-16.8	6.4	47.1	79	12
Long-term SME lending / Total SME lending (share in %)	63.6	21.6	16.6	67.5	108.3	86	13
Total SME lending / Total corporate lending (share in %)	31.6	18.0	10.8	25.7	76.4	158	21
Interest rate spread [small – large firms] (in %)	2.3	2.9	0.1	1.7	11.9	110	15
Banking system controls							
Bank assets / GDP (%)	212.5	186.5	21.5	147.4	829.2	159	22
Bank liquid assets /Assets (%)	16.5	9.2	2.8	13.9	33.9	157	22
Deposit-to-assets ratio (%)	60.2	16.9	14.7	60.9	92.9	159	22

	Mean	SD	Min	p50	Max	n	Countries
Tier1 / Risk weighted assets (%)	13.1	2.3	7.0	12.9	19.4	156	22
Tier1 / Assets (%)	6.9	2.4	0.8	6.4	13.7	156	22
Bank foreign claims / Global foreign claims (%)	4.0	4.7	0.0	1.6	15.7	146	22
Macroeconomic controls							
Credit to GDP gap (%)	0.7	13.4	-51.1	2.2	38.6	176	22
Real GDP growth (%)	2.8	2.6	-3.5	2.4	15.2	176	22

Sources: FSB questionnaire on SME financing, BIS, CGFS, IMF WEO.

Differences in the relative importance and structure of SME financing reveals important cross-country variation that the empirical analysis seeks to exploit. Over the 2010-17 period, total SME and corporate loan issuance exhibit very similar characteristics (Table 6). Both grow at about 7-7.5% on average, with total SME lending revealing to be slightly more volatile. The share of SME lending in banks' total corporate portfolio reaches 32%, on average. Its vast range (11-76%) reflects substantial differences in the relative importance of SME lending across FSB jurisdictions. Within the SME lending segment, long-term lending seems to dominate in most jurisdictions, making up 64%, on average. Notably, banks charge higher interest rates on SMEs than on other corporates across all jurisdictions, with the SME premium ranging from 0.1 to almost 12% in the sample.

2.1.4 Overall Results

This analysis provides some weak evidence for a decline in SME lending growth for the most exposed jurisdictions after the introduction of RBC reforms, the first of the new Basel III regulations to be announced and implemented (see Table 7).

For G-SIB and D-SIB regulation, the analyses considered as "most exposed" those jurisdictions characterised by highly concentrated banking systems. For these jurisdictions, the introduction of G-SIBs/D-SIBs reforms are associated with an increase in the growth rate of SME lending. However, taking the net effect of the announcement and legal framework, the analysis does not find a significant impact on SME lending when considered as a share of total corporate lending. Likewise, the net effect on interest rates turns out to be insignificant.

Furthermore, this aggregate analysis does not provide conclusive evidence on the effect of the leverage ratio (LR), probably because other capital-related reforms had already induced banks to build up capital. With a stronger capital base, the most exposed banks had been better prepared to also comply with the LR reform, one of the latest in the sequence of all considered Basel III reforms.

Evidence on the LCR reform effect also remains relatively weak, suggesting a temporary acceleration in the pace of short-term lending growth and a more permanent increase in the interest rate spread of SME over total corporate lending.

Table 7

Summary of the FSB survey analysis results

		FSB Survey							
		ΔTotal SME lending	**ΔTotal SME lending**	Of which **ΔSME lending (short term)**	Of which **ΔSME lending (long term)**	**ΔTotal corporate lending**	**Total SME/total corporate (share)**	**SME LT-lending (share)**	**Interest Rate**
		All obs	**Balanced sample**			**All obs**	**All obs**	**All obs**	**All obs**
RBC	Temporary		- - -[2]	- - -[2]	- -[2]				
	Persistent		- - (A)	- - - (A)	- (A)				
G-SIB	Temporary		-		-[2]	+[2]			
	Persistent	++(A)				+(A)[2]	++ (A) - - - (L)		+++ (A) - - - (L)
LCR	Temporary			+[2]					
	Persistent								+(A)
LR	Temporary								
	Persistent								

Note: This overview table refers to specifications (FSB1) for *temporary* effects on growth rates, and (FSB3) for *persistent* effects on growth rates in columns 1-5. Columns 6-8 draw on specification (FSB2) reflecting *persistent* effects on shares. For the *temporary* estimates the following notation is used: "+" occurs if at least one estimated interaction coefficient is significant and positive, "++" if at least half of the estimated interaction coefficients is significant and positive, and "+++" if more than half of the estimated interaction coefficients is significant. Using "-", "--" and "---", respectively, proceeds in parallel for coefficient estimates that are less than zero. For the *persistent* effect analysis models, both Announcement (A) and Legal-Framework (L) are considered if both implementation stages do not coincide. Capital letters (A) or (L) in parenthesis next to the – or +signs indicate statistically significant interaction coefficients of the respective implementation stage.

[2] The sum of coefficients is statistically significant and different from zero.

RBC reforms

Results provide some weak evidence of a negative reform impact on SME lending growth in the most exposed banking systems. When considering the full sample of jurisdictions, the reforms are found to have no differential effects (neither temporary nor persistent) on the pace of SME or total corporate lending. However, when restricting the analysis to a balanced sample of 12 jurisdictions[17] that also reported information on the lending tenor, results suggest both a *temporary* (Table 8, column 2, Bank#Announcement) and *persistent* slowdown in SME lending growth for the most exposed countries (Table 9, column 2 Bank#Announcement). For these jurisdictions, short-term average lending growth (Table 9, column 3) declined relatively more than long-term lending growth (Table 9, column 4) when considering the persistent effect. However, this difference was not strong enough to impact the maturity composition of banks' SME loan portfolio over the post-reform period (Table 7, detailed results not shown). These findings, however, only apply to this particular subset of jurisdictions featuring both advanced economies (8 jurisdictions) and emerging markets (4 jurisdictions).

[17] Not all 21 jurisdictions enter each analysis. Advanced economies (AU, CA, CH, DE, ES, FR, HK, IT, JP, KR, NL, SG, UK and US); emerging markets and developing economies (AR, BR, ID, IN, MX, RU, TR, ZA). The 12 countries that provided a maturity breakdowns are: 4 EMDEs (AR, BR, ID, MX) and 8 AE (DE, ES, FR, IT, JP, KR, NL, SG).

Table 8

Temporary effects on growth rates of credit

Dependent Variable:	**ΔSME lending (unbalanced)**	**ΔSME lending (balanced)**	**Of which Δshort term SME lending**	**Of which Δlong term SME lending**	**ΔTotal (corporate) lending**
Announcement_t	-0.712	5.195	-6.811	-6.184	-3.410
	(6.071)	(15.563)	(15.346)	(6.697)	(5.286)
Announcement_t-1	-1.007	3.124	0.076	-5.696	1.301
	(4.975)	(10.833)	(11.017)	(8.913)	(4.482)
Announcement_t-2	-3.148	-3.835	-2.355	-5.854	-1.174
	(3.880)	(6.268)	(3.916)	(8.070)	(4.107)
Bank(0/1)*Announcement_t	-2.222	-12.810*	-16.554**	-7.550	-0.196
	(4.538)	(5.947)	(7.073)	(5.558)	(5.765)
Bank(0/1)*Announcement_t-1	0.090	-13.587*	-16.746*	-9.109*	-1.417
	(5.458)	(6.991)	(8.767)	(5.019)	(4.364)
Bank(0/1)*Announcement_t-2	-3.145	-18.311*	-18.930**	-20.689*	-4.653
	(7.615)	(8.885)	(6.292)	(10.765)	(6.211)
L.C_TA	-0.090***	0.070	0.082	0.100	-0.086**
	(0.025)	(0.083)	(0.063)	(0.097)	(0.031)
L.C_Deposit_Funding	-0.012	1.140*	1.639*	1.370*	-0.040
	(0.500)	(0.615)	(0.749)	(0.715)	(0.518)
L.C_Liquidity	-0.578	-0.547	0.547	-0.437	-0.525
	(0.488)	(0.458)	(0.833)	(0.723)	(0.529)
L.C_Internationalisation	3.131***	3.520***	4.996***	3.074**	3.081***
	(0.785)	(0.804)	(0.957)	(0.991)	(1.001)
L.C_Econ_Financial_Cycle	0.045	0.406***	0.437**	0.334*	-0.026
	(0.183)	(0.119)	(0.170)	(0.171)	(0.280)
L.C_Econ_GDP_Growth	0.919	0.822	0.827**	0.744	0.365
	(0.567)	(0.663)	(0.373)	(0.872)	(0.735)
Sum Coefficients	-5.277	-44.71	-52.23	-37.35	-6.266

Dependent Variable:	ΔSME lending (unbalanced)	ΔSME lending (balanced)	Of which Δshort term SME lending	Of which Δlong term SME lending	ΔTotal (corporate) lending
F-statistic (joint significance of the interaction terms)	0.153	7.825	8.860	8.379	0.207
(p-value)	0.700	0.0174	0.0126	0.0146	0.654
Observations	147	77	77	77	147
R-squared	0.557	0.693	0.681	0.693	0.532
Number of Countries	21	12	12	12	20

Note: This table shows the estimation results for specification (FSB 1) over the 2010-2017 period. All columns include separate time and country fixed effects, with standard errors being clustered at the country level. ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively.

Table 9

Persistent effects on growth rates of credit

Dependent Variable:	ΔSME lending (unbalanced)	ΔSME lending (balanced)	Of which Δshort term SME lending	Of which Δlong term SME lending	ΔTotal (corporate) lending
Announcement_t	3.045	12.967	-7.770	0.866	2.431
	(7.913)	(17.620)	(11.509)	(6.233)	(6.378)
LegalFramework_t	-0.077	-8.180	-16.010**	-3.478	0.935
	(4.951)	(8.059)	(6.855)	(8.272)	(5.961)
Bank(0/1)*Announcement_t	-5.623	-17.137**	-23.363***	-13.703*	-6.097
	(6.721)	(6.377)	(6.116)	(6.749)	(5.677)
Bank(0/1)*LegalFramework_t	-2.293	14.254	12.049	4.951	-1.226
	(6.217)	(8.559)	(10.583)	(5.562)	(5.251)
L.C_TA	-0.094***	-0.238*	-0.226*	-0.119	-0.090*
	(0.032)	(0.129)	(0.120)	(0.126)	(0.049)
L.C_Deposit_Funding	0.081	1.027*	1.478*	1.240*	0.061
	(0.489)	(0.545)	(0.741)	(0.659)	(0.503)
L.C_Liquidity	-0.450	-0.460	0.658	-0.253	-0.509

Dependent Variable:	ΔSME lending (unbalanced)	ΔSME lending (balanced)	Of which Δshort term SME lending	Of which Δlong term SME lending	ΔTotal (corporate) lending
	(0.425)	(0.672)	(0.736)	(0.832)	(0.489)
L.C_Internationalisation	3.074***	2.786**	3.603**	2.827*	2.943***
	(0.748)	(1.207)	(1.172)	(1.321)	(0.892)
L.C_Econ_Financial_Cycle	-0.008	0.545***	0.506*	0.356**	-0.070
	(0.191)	(0.143)	(0.254)	(0.157)	(0.288)
L.C_Econ_GDP_Growth	0.757	0.754	0.828	0.667	0.158
	(0.603)	(0.962)	(0.625)	(1.229)	(0.789)
Sum Coefficients	-7.916	-2.883	-11.31	-8.752	-7.324
F-statistic (joint significance of the interaction terms)	1.761	0.0687	0.622	0.802	2
(p-value)	0.200	0.798	0.447	0.390	0.173
Observations	147	77	77	77	147
R-squared	0.555	0.639	0.652	0.621	0.524
Number of Countries	21	12	12	12	20

Note: This table shows the estimation results for specification (FSB 3) over the 2010-2017 period. All columns include separate time and country fixed effects, with standard errors being clustered at the country level. ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively.

With respect to total corporate lending, there is no significant RBC impact. Both temporary (Table 8) and persistent (Table 9) interaction coefficients for total corporate lending growth are insignificant. Also the persistent effect on the share of SME lending over total corporate lending (not shown) turns out to be insignificant.

Analysing the spread of SME interest rates over rates charged on larger companies does not provide any significant results, either. The reason could be that both rates move in lockstep and the SME premium remained constant over the entire 2010-2017 period.

The estimated coefficients for the control variables broadly align with expectations and the literature, thereby corroborating the findings. They also reveal to be robust when adding interaction effects or running regressions for other reforms. In particular, more retail-oriented banking systems with higher shares of bank deposit funding see, on average, higher SME lending growth. Also, economic upswings (GDP growth and financial cycle) accelerate the pace of SME financing. The cross-country analysis also suggests that more internationalised banking systems see higher SME as well as total corporate lending growth.

A host of RBC-focused robustness checks explores whether jurisdictions that have been affected by a macroeconomic crisis exhibit any stronger reforms effects. Table 10 shows the list of robustness specifications controlling for adverse economic conditions, Table 11 outlines the respective findings, while Table 12 provides some selected interaction effects.

Table 10

List of robustness checks

I	**Full and balanced country samples (baseline) while excluding the most *Crisis-hit* countries.** [18]
II	Baseline, while adding a triple interaction of the crisis-hit countries, the regulation indicator and the banking system exposure dummy (Crisis-hit#Reg#Bank(0/1)).
III	Baseline, but substitute the (double) Bank(0/1)# Reg interaction with the (double) Crisis-hit#Reg interaction.
IV	Baseline, but substitute the (double) Bank(0/1)#Reg interaction with the interaction of lagged GDP growth and the regulation indicator.
V	Baseline with a triple interaction (Bank(0/1)#Reg#GDP(-1%)) that captures the potentially amplifying effect of negative GDP growth as signalled by a (time-varying) dummy variable that is one when the real annual GDP growth is -1% or less and zero in all other cases.
VI	Baseline with a triple interaction that captures a time-invariant dummy variable that indicates countries that are in the 50th percentile of real GDP growth for the 2010 to 2017, on average (Bank(0/1)#Reg#GDPp50).
VII	Specification VI, while only keeping the announcement dummies.

Findings on the robustness checks suggest that the reform effects might have played out stronger in countries with adverse macroeconomic conditions.

First, when excluding jurisdictions undergoing a macroeconomic downturn from the balanced sample (specification I, Table 12, top panel)[1], the *temporary* decline interactions for both ST and LT lending retain their significance. Estimating the persistent effects also replicates previous results (not shown). When including a dummy for these countries (specification II), results remain unchanged, confirming that there is some (weak) indication of an additional negative effect for these jurisdictions.

As a further robustness check, when replacing the banking system exposure by the rate of real GDP growth, a similar slowdown in SME lending growth emerges for countries with a negative

[18] The selection of these countries is based on the fact that (i) these countries experienced less than -1% annual growth rates of GDP in at least two of the initial implementation periods (2011-2014), and (ii) experienced a banking or currency crisis in the period 2009-2014 as identified by Laeven and Valencia (2018).

[1]

rate of growth (specification IV, Table 12, second panel, GDP growth is however defined in positive terms). This finding suggests another effect that might run in parallel and could potentially reinforce the regulation effect.

Another series of robustness checks address the potentially reinforcing effect of adverse macroeconomic conditions by adding a triple interaction coefficient. Different indicators have been constructed and interacted. Results on the temporary effects for SME lending remain unaffected and suggest a decline in SME lending growth after the announcement (specification V, Table 12, bottom panel, double interaction). Given the small sample, the triple interaction reveals to be insignificant. Yet, for the full sample estimation of 21 countries, the temporary triple interaction coefficients (Table 12, bottom panel, first column) now actually turn negative and statistically significant for the most exposed countries with GDP growth rates of -1% or less. In the most exposed jurisdictions where GDP shrank over the previous period, the decline in SME lending growth was hence even stronger. Also, findings suggest that reinforcing macro effects are not unique to SME lending, but can also be found for total corporative lending (Table 12, bottom panel, last column).

Table 11

Summary of results: RBC reform

		FSB Survey[1]							
		ΔSME lending (unbalance)	**ΔSME lending (balanced)**	**Of which Δshort term SME lending**	**Of which Δlong term SME lending**	**ΔTotal corporate lending**	**Total SME/total corporate (share) All obs**	**SME LT-lending (share) All obs**	**Interest Rate All obs**
RBC baseline	Temporary		- - -[2]	- - -[2]	- -[2]				
	Persistent		- - (A)	- - - (A)	- (A)				
I. Excluding 3 crisis-hit countries.	Temporary			-	-				
	Persistent		- (A)	- - (A) + (L)	- (A)				+[2]
II. Dummy (AR,ES, IT)	Temporary		- - -[2]	- - -[2]	-[2]				
	Persistent		- - (L)	- - (A) ++ (L)					
	Trans-c	-	-	-	-	-	+		
	Pers-c								
III. Dummy (AR,ES, IT)-No	Temporary	-[2]	-[2]	-[2]	-[2]	-[2]			
	Persistent		- - (A)[2]	- - (A)[2]	- - (A)[2]				

bank exposure									
IV.GDP	Temporary		+++[2]	++[2]	+[2]				
	Persistent		++ -	+++[2] - -				+++(A) [2]	
V. GDP (-1%)	Temporary		- [2]	- - [2]	- [2]				
	Persistent		- (A)	- (A)	- (A)		+		
	Trans-c	-				-			
	Pers-c		+ (A)		+ (A)				
VI. GDP (p50)	Temporary	-	- - -[2]	- - -[2]	- - -[2]				
	Persistent		- - (A) +++ (L)	- - - (A) +++ (L)	- - (A) +++ (L)		+[2]		+[2]
	Trans-c	+	- +	-	- - +				
	Pers-c	- - (A)	- - - (L)	- - - (L)	- - - (L)	- - (A)			
VII. GDP (p50) / L	Temporary	-	- - -[2]	- - -[2]	- - -[2]				
	Persistent	+	- -	- - -	-		+		
	Trans-c	+	- +	-	- - +				
	Pers-c	- - -			- -				

[1] Note: For the *temporary* estimates, "+" if at least one estimated interaction coefficient is significant and positive, "++" if at least half of the estimated interaction coefficients is significant and positive, "+++" if more than half of the estimated interaction coefficients is significant. Using "-" denotes the same as described before, but with coefficients that are less than zero. For the *persistent* effect analysis, both Announcement (A) and Legal-Framework (L) dummies were used if possible. Capital letters in parenthesis next to the – or +signs indicate which interaction coefficient was statistically significant. "Trans-c" and "Pers-c" reflect triple interaction effects.

[2]The sum of coefficients is statistically significant and different from zero.

Table 12

RBC: Robustness to macroeconomic conditions (double and triple interactions)

		ΔSME lending (unbalance)	ΔSME lending (balanced)	Of which Δshort term SME lending	Of which Δlong term SME lending	ΔTotal (corporate) lending
I Excluding 3 crisis-hit countries	*Temporary*					
	Bank(0/1)*Announcement_t	-3.471	-10.342	-27.507***	-11.595**	2.984
		(5.865)	(6.844)	(7.613)	(5.027)	(7.127)
	Bank(0/1)*Announcement_t-1	-5.617	0.798	-11.945	-5.316	0.014
		(6.277)	(10.111)	(12.631)	(6.426)	(4.896)
	Bank(0/1)*Announcement_t-2	2.587	5.596	-6.361	5.626	0.583
		(6.066)	(10.235)	(12.645)	(11.118)	(5.585)
IV Real GDP growth	*Temporary*					
	L.GDP_Growth*Announcement_t	0.219	4.638**	5.200**	4.004*	1.303
		(1.052)	(1.750)	(1.897)	(1.953)	(1.237)
	L.GDP_Growth*Announcement_t-1	-0.091	1.987*	3.292	1.055	0.475
		(1.507)	(1.038)	(2.516)	(0.769)	(0.991)
	L.GDP_Growth*Announcement_t-2	1.522	3.174*	4.789***	3.264	1.691
		(1.572)	(1.667)	(1.133)	(2.554)	(1.539)
V. Real GDP growth dummy (-1%)	*Temporary*					
	Bank(0/1)*Announcement_t	-1.900	-10.220	-16.769*	-3.699	-0.154
		(4.755)	(7.080)	(7.911)	(7.020)	(5.902)
	Bank(0/1)*Announcement_t-1	-1.157	-14.160*	-15.498	-10.686*	-2.382
		(5.725)	(7.396)	(9.003)	(4.909)	(4.592)
	Bank(0/1)*Announcement_t-2	1.282	-15.749	-15.733**	-18.194	0.307
		(8.062)	(9.434)	(6.009)	(11.231)	(6.359)
	GDP(-1%, 0/1) *Bank(0/1)*Announcement_t-1	2.782	0.289	-4.115	2.740	4.257
		(5.208)	(5.238)	(6.783)	(6.955)	(6.060)
	GDP(-1%, 0/1) *Bank(0/1)*Announcement_t-2	-20.869**	-7.701	-8.799	-7.736	-17.163**
		(7.403)	(7.509)	(5.885)	(10.491)	(7.145)

Note: This table shows the estimation results for robustness checks presented in Table 10. It only presents the interaction effects. All columns include separate time and country fixed effects, with standard errors being clustered at the country level. ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively.

2.1.5 Conclusions

This cross-country study finds some weak evidence of temporarily slowing SME lending growth after the RBC reforms. The effects emerge for those banking system which reported relatively lower aggregate capitalisation ratios (i.e. the most exposed banking systems) before the RBC reforms had been implemented. The negative effect on lending growth rates is found for both long- and short- term maturities. Yet, the slowdown disappears in a larger sample including jurisdictions which do not provide the maturity breakdown of SME lending.

By contrast, results show that there is no significant RBC impact on total corporate lending.

There are indications of potentially reinforcing effects of macroeconomic developments, in that the slowdown in SME lending growth appears to be more pronounced for those jurisdictions

most affected by a macroeconomic crisis. In addition, when explicitly letting the GDP-decline indicator interact with regulation and the pre-reform capitalisation of banking systems indicators, this analysis finds evidence of a reinforcing negative impact on SME lending. The negative impact is however also observable for total corporate lending during periods of negative economic growth rates.

2.2 Capital IQ Analysis

This analysis aims to complement other pieces of the analysis by looking at real sector outcomes in terms of debt and investment. SMEs might have needed to adjust their business, cut investment and restructure their balance sheets when facing financial constraints. These financial constraints might arise from a decline in banks' willingness to provide SME financing. The study adopts a cross-country perspective, while taking divergent macro-developments into account. As Capital IQ, a commercial data source, provides firm-level data on SMEs as well as larger companies, the analysis can compare real sector outcomes to analyse whether there was a unique SME effect in response to the Basel III bank regulation package.

Identification is granted by exploiting firm-level heterogeneity and cross-country differences in the implementation stages.

2.2.1 Data description

To analyse the impact of regulatory changes on SME lending at the individual firm level, the analysis mainly relies on commercial data from Capital IQ. This dataset contains balance-sheet information of firms located in multiple countries for the period 2002 to 2017. In order to avoid distorting effects from the Great Financial Crisis (GFC), this analysis restricts the estimation sample to 2010-17.

2.2.2 Adjustments and data cleaning procedure

The coverage of firms, in particular SMEs, varies across jurisdictions. Some jurisdictions reported less than 50 SMEs per year on average. Hence, constructing the sample implies trading off the benefits from a larger overall sample with more observations against the representativeness of the national firm-level data. In the end, the sample captures only those jurisdictions with at least 100 SMEs per year. In doing so, the retrieved sample of 22 jurisdictions reduces to a sample of 9 countries. Table 13 presents the number of firms per country that enter the analysis in each year.

As CIQ's coverage of firms still varies substantially, this analysis uses a weighted regression shown below. The idea is to lessen the weight of the estimates from well-covered countries and give more prominence to firms in less well-covered countries. Further, this analysis restricts the sample to those firms that provide breakdowns of their debt into a long-term and a short-term component, and which reveal information on their total fixed assets to capture investment.

Table 13

Capital IQ firm-level coverage by country

Country	2010	2011	2012	2013	2014	2015	2016	2017	Full period
CA	135	145	141	130	123	138	133	115	1060
DE	1006	1161	1125	1105	1065	842	727	223	7254
ES	16385	17818	16322	15888	15873	15837	14702	6537	119362
FR	403	785	1676	7011	7443	7693	6188	3660	34859
GB	4253	5349	5643	5865	6008	6012	5577	3895	42602
IT	19385	21057	19999	19457	17333	18867	18087	14134	148319
US	330	379	357	357	348	318	292	247	2628
JP	30	38	39	16627	38420	41995	42443	38565	178157
KR	2687	3127	3309	3301	2086	2361	4068	3626	24565
Total	44614	49859	48611	69741	88699	94063	92217	71002	558806

Source: Capital IQ.

We apply the following steps to prepare the data for the empirical analysis. First, to avoid distorting effects from exchange rate fluctuations and inflation rates this analysis establishes a common metric for the data that consists of firms located in nine different jurisdictions. Firms report their balance-sheet information in local currency units. In order to harmonise the data across jurisdictions, the analysis converts all balance-sheet items into USD using the average effective exchange rate between the local currency and USD over the year 2007 as collected by the BIS. Then, to account for varying inflation rates across countries, these values are deflated using the GDP deflator provided by the IMF[19] for a broad set of countries. As firms report outstanding stocks listed on their balance sheets on an annual basis, this analysis takes log changes to obtain annual growth rates for the empirical analysis.

Second, in order to reduce the sensitivity of the regressions to outliers, the dependent as well as the explanatory variables are winsorised. To do so, this analysis sets all observations for which percentage changes (based on log-differences) of the dependent variable (total debt, long-term debt, short-term debt, total fixed assets) exceed 100% in absolute value to 100%. For the share of long-term debt in total debt, this analysis drops ratios that exceed 100%. Then, the explanatory variables are winsorised at the 2.5% level in each tail. We hence assign all values to the 2.5 and 97.5-percentile of the individual distribution, if the values lie either above the upper, or below the lower threshold in the distribution of all firms. Finally, this analysis keeps only firms in the sample that report figures for all variables in at least 3 consecutive years[20].

For each country, Figure 7 shows the evolution of the median firm's total debt and total fixed assets, respectively. Overall, no clear patterns emerge which demands for a more sophisticated empirical analysis. Note that significant changes from one period to the next like in the case of JP originate for changes in the underlying firm sample that the regression analysis can take into account.

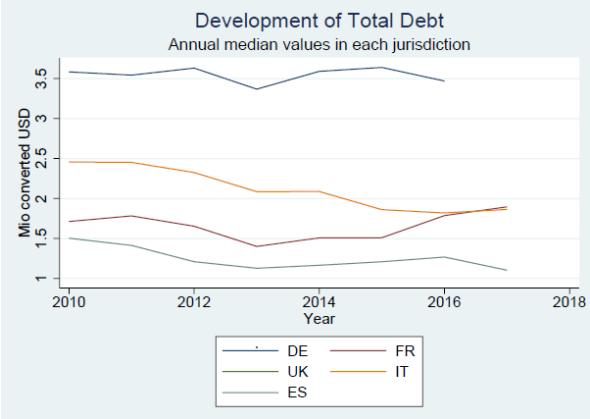
[19] The IMF World Economic Outlook Database is available at https://www.imf.org/external/pubs/ft/weo/2018/02/weodata/index.aspx.

[20] This means that all variables for firm *f* at time *t* report values that are within the corresponding boundaries.

Real outcome variables of the Capital IQ analysis Figure 7

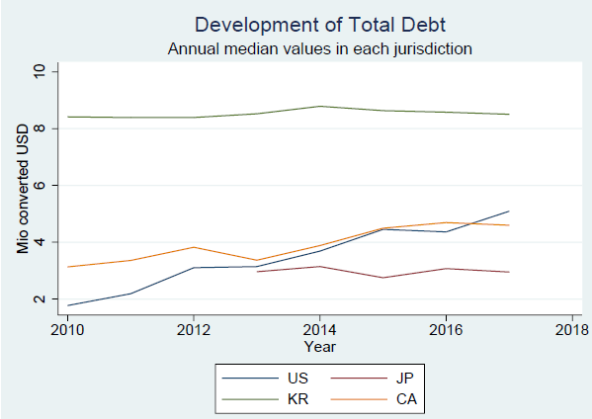
EU

USD mn

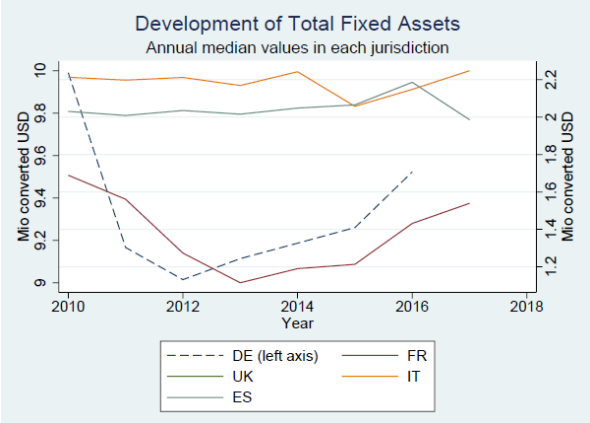


Non-EU

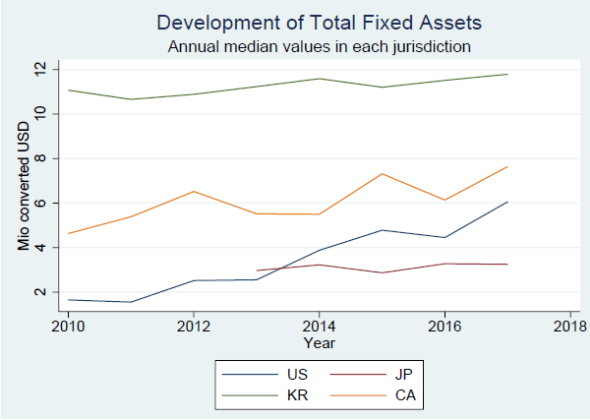
USD mn



EU



Non-EU



Source: Capital IQ

2.2.3 Empirical Specification

The baseline specification (CIQ 1) exploits heterogeneity across firms and countries to identify the impact of regulatory reforms on SME financing.

$$Y_{f,c,t} = \beta \ \ Firm(0/1)_{f,c,t-1} + \left(\beta_{RF}^{A} RegA_{t}^{pers} + \beta_{RF}^{B} RegL_{t}^{pers}\right) * Firm(0/1)_{f,c,t-1}$$
$$+\beta_{F} C\_Firm_{f,c,t-1} + FE(f, c\#t) + \varepsilon_{f,c,t} \qquad \text{(CIQ 1)}$$

With

$Y_{f,c,t}$	Δln in total, short-term and long-term debt, total fixed assets (in %)
	Long-term debt ratio (long-term debt to total debt)
$RegA_t^{pers}$	RBC, LCR, LR and G-SIB, persistent announcement indicator
$RegL_t^{pers}$	RBC, LCR, LR and G-SIB, persistent legal framework indicator
$Firm(0/1)_{f,c,t-1}$	Above-median indicators of firm characteristics at the country-year level.
$C\_Firm_{f,c,t-1}$	ln size, current ratio, equity ratio, ROE as continuous controls
$FE(f, c\#t)$	Firm and country-by-time firm fixed effects

The dependent variable captures changes in total debt, long-term debt, short-term borrowing, and tangible fixed assets, as well as the ratio of long-term debt to total debt.

We construct several indicator variables $Firm(0/1)_{f,c,t-1}$ that switch to the value of one if a firm exhibits, for instance, a profitability level above the median of its country-level peers in a given year. These firm characteristics include logged total assets and measures of firm liquidity (ratio of current assets to current liabilities), leverage (ratio of equity to total assets) and profitability (the ratio of earnings before taxes to equity).

The interaction terms of these firm indicators with the regulation dummies serve as the key identification strategy. In order to assess whether the effect of regulation is significant, while taking into account that the regulatory impact might play out differently for different firms, the analysis focuses on the coefficient estimates of β_{rf}. Unless they coincide, this approach takes both implementation stages (announcement and legal framework) into account.

We add a parallel set of lagged firm-level control variables $C\_Firm_{f,c,t-1}$. It is important to note that they are not collinear. While the indicator $Firm(0/1)_{f,c,t-1}$ fleshes out specific firms at the country-time level with a relevant borrower characteristic, $C_Firm_{f,c,t-1}$controls for remaining individual firm-level characteristics. Letting both jointly enter the specification takes potential non-linearities of the covariates into account. Further, the analysis interacts the firm indicator $Firm(0/1)_{f,c,t-1}$ with the reform dummy to facilitate the interpretation of post-reform effects.

We add firm fixed effects to absorb time-invariant firm heterogeneity, and country-by-time fixed effects to absorb any country-specific macroeconomic variation. These country-by-time fixed effects do not allow for a joint inclusion of the regulation indicator. In all specifications, this analysis clusters standard errors at the country-by-sector level.

Table 14 provides some descriptive statistics on the estimation sample. The figures provide an indication that long-term debt is the dominating financing source for SMEs. On average, the amount of outstanding long-term is 50% higher than the amount of outstanding short-term borrowing. In the sample period, short-term borrowing experiences higher growth rates than long-term debt, indicating that short-term loans might have become more important for SMEs.

Table 14

Descriptive statistics

	Description	N	Mean	Sd	Min	Max
Dependent Variables						
Long-Term Debt	Outstanding long-term debt in US$ mn	558,806	2.726	10.896	0.00001	3149.65
Short-Term Borrowing	Outstanding short-term borrowing in US$ mn	558,806	1.789	5.099	0.000	2098.42
Total Debt	Outstanding total debt in US$ mn	558,806	4.620	13.380	0.00001	3161.825
Total Fixed Assets	Total fixed assets in US$ mn	558,806	5.942	34.693	0.000	17514.52
ΔY_LTD	Growth of long-term debt in % (log changes)	558,806	13.731	54.661	-100	100
ΔY_STD	Growth of short-term debt in % (log changes)	558,806	32.708	55.434	-100	100
ΔY_TDebt	Growth of total debt in % (log changes)	558,806	7.955	43.754	-100	100
Y_LTDRatio	Share of long-term debt over total debt	558,806	57.892	32.137	0.0001	100
ΔY_TotalFA	Growth of total fixed assets in % (log changes)	558,806	5.830	29.544	-100	100
Firm Controls						
Ln(TA)	log of Total Assets in US$	558,806	15.966	0.902	3.689	23.619
Firm_Current_Ratio	Ratio of current assets to current liabilities in %	558,806	1.735	1.444	0.003	57.775
Firm_Equity_Ratio	Equity ratio in %	558,806	29.009	22.774	-100	97.028
Firm_ROE	Profit before taxes over equity in %	558,806	0.082	0.406	-8.570	9.247

Source: Capital IQ.

2.2.4 Results

This analysis studies the persistent effects of Basel III regulatory reforms on SME financing and investment. The analysis focuses on four Basel III reforms: RBC, GSIB/DSIB, LCR, and LR.

In principle, the analysis considers persistent effects of two major implementation steps: the national announcement and the point in time, when a country-specific legal framework was published. Among the considered reforms and countries, only for the RBC does the analysis have sufficient variation in these implementation stages for the empirical analysis to yield meaningful results (Figure 2). Further, the RBC reform was the first to be implemented. For this reason, the persistent effects that the analysis considers for the RBC most likely also capture

the effects of later reforms. The focus is hence on the RBC effects, implicitly acting as a proxy for the full set of Basel III reforms. Table 15 summarises the results for all considered reforms.

Table 15

Summary of Capital IQ analysis results

		Long-Term Debt	Short-Term Borrowing	Total Debt	Long-Term Debt Ratio	Total Fixed Assets
Full Sample						
RBC	Announcement	ns	ns	ns	ns	ns
	Legal Framework	Liquidity: - Capital: + Profits: +	ns	Capital: +	Size: +	ns
G-SIB	Announcement	ns	ns	ns	ns	ns
LCR	Announcement	ns	ns	Capital: +	ns	ns
LR	Announcement	ns	Size: +	ns	Capital: +	Profits:+
EU Sample						
RBC	Announcement	Profits: -	Capital: +	Capital: +	Liquidity: -	Size: - Liquidity: +
	Legal Framework	Capital: + Profits: +	ns	Capital: + Profits: +	Size: +	Capital: + Profits: +
G-SIB	Announcement	Capital: + Profits: +	Profits: +	Capital: + Profits: +	Size: +	Capital: + Profits: +
LCR	Announcement	Capital: +	Size: + Profits: +	Capital: + Profits: +	Size: +	Capital: + Profits: +
LR	Announcement	Size: + Capital: +	Size: +	Capital: +	Size: + Liquidity: -	Liquidity: + Capital: + Profits: +

Note: This table summarises the findings based on specification (CIQ 1) across all reforms and outcome variables at the firm level. It considers both *persistent* effects of the announcement and legal framework implementation stages. Only the estimates on the interaction coefficients with firm characteristics (like liquidity, capitalisation and profitability) are presented. Both samples cover the 2010-17 period. All columns include separate firm and country-by-time fixed effects, with standard errors being clustered at the country-by-sector level. "ns" means that the result is not statistically significant at the usual confidence levels. The table should be interpreted as follows: e.g. "Liquidity: –" in the "RBC – Legal framework" row, "Long-Term Debt" column, means that after the legal framework for RBC was implemented, the most liquid SMEs experienced a decrease in long term debt, after controlling for confounding factors.

RBC Reforms

The results provide evidence that the RBC reforms strengthens the effect of specific SME characteristics that had proven beneficial to access bank funding before reforms entered into force. Overall, the RBC effect seems to unfold only after the legal framework was published in individual countries (Table 16). By contrast, announcement effects hardly reveal any significant effects. When comparing SMEs within one country, the firm interaction coefficients show that more profitable and better capitalised firms raise their long-term funding faster. In the case of better capitalised firms, the surge in long-term debt also accelerates their pace of total debt increase. There is no equivalent rise in short-term borrowing, while the long-

term debt ratio remains unaffected. The results also show that firms with more liquid assets holdings (higher current ratio) cut their long-term borrowing in the aftermath of the RBC implementation.

When comparing SMEs within one country for the period before the reforms, the firm indicator variables suggest that better-capitalised firms borrow more in general. Further, more liquid assets holdings (higher current ratio) go along with more investment, higher short-term and lower long-term growth rates of debt, although these firms, on average, still exhibit higher long-term debt ratios. The results also reveal that more profitable SMEs in terms of ROE also tend to invest more. In this context, the analysis does not elaborate on the effect of SME firm size, as it vastly differs across countries. A relatively large SME in one country could count among the smallest firms in another country.

Table 16

Estimation Results on the RBC reform

	Baseline					**EU (DE,ES,FR,IT,UK)**				
VARIABLES	ΔLTD	ΔSTD	ΔTdebt	LTD Ratio	ΔTFA	ΔLTD	ΔSTD	ΔTdebt	LTD Ratio	ΔTFA
Reform#Firm(0/1)										
ANN(0/1)*F_lnTA(0/1)	7.930	1.811	2.127	2.147**	-0.842	2.198	-0.768	1.326	0.796	-1.708**
	(5.152)	(3.662)	(4.280)	(0.851)	(1.560)	(1.756)	(1.273)	(1.598)	(0.602)	(0.748)
ANN(0/1)*F_CurrRatio(0/1)	-2.242	1.511	-0.593	-1.317	1.164	1.117	1.814	-0.446	-1.538**	1.643***
	(2.281)	(1.504)	(3.171)	(1.214)	(1.858)	(1.725)	(1.067)	(1.342)	(0.660)	(0.534)
ANN(0/1)*F_Equity(0/1)	-4.176	0.546	-1.577	-0.024	-0.325	1.188	1.930*	3.108***	-0.360	0.873
	(4.649)	(2.130)	(2.840)	(0.797)	(1.691)	(1.538)	(1.077)	(1.049)	(0.355)	(0.807)
ANN(0/1)*F_ROE(0/1)	-4.602	1.844	0.437	0.689	0.150	-3.325*	-0.443	-0.537	-0.513	0.410
	(3.901)	(2.397)	(2.629)	(1.244)	(1.744)	(1.856)	(0.874)	(1.138)	(0.552)	(1.346)
LEG(0/1)*F_lnTA(0/1)	1.089	-0.024	1.512	1.139**	-0.038	0.211	0.881	-0.058	0.548	-0.190
	(2.905)	(1.669)	(2.339)	(0.476)	(1.412)	(0.933)	(0.954)	(1.208)	(0.341)	(0.697)
LEG(0/1)*F_CurrRatio(0/1)	-4.350*	1.518	-2.343	-0.872	0.987	-2.420	-0.775	-1.417	-0.354	0.588
	(2.319)	(1.962)	(1.703)	(0.867)	(0.976)	(1.457)	(0.844)	(1.330)	(0.511)	(0.736)
LEG(0/1)*F_Equity(0/1)	3.793*	-0.977	3.918**	-0.334	2.140	5.013***	0.331	3.117**	0.046	1.488***
	(2.007)	(1.752)	(1.905)	(0.661)	(1.370)	(1.231)	(0.985)	(1.132)	(0.332)	(0.515)
LEG(0/1)*F_ROE(0/1)	3.761**	-1.860	1.871	0.005	0.326	2.973***	1.850	1.946**	-0.073	1.206*
	(1.670)	(2.219)	(1.516)	(0.574)	(1.106)	(0.739)	(1.089)	(0.879)	(0.285)	(0.685)
Firm										
F_lnTA	-13.742***	-5.362**	-16.889***	-1.110	-17.967***	-18.168***	-14.384***	-21.231***	-1.090	-18.363***
	(1.684)	(2.004)	(1.399)	(0.725)	(1.589)	(1.361)	(1.467)	(1.740)	(1.095)	(1.581)
F_CurrRatio	-0.938*	1.018**	0.560*	0.462	2.230***	-4.534***	0.022	-0.616	0.776***	1.764***
	(0.544)	(0.409)	(0.289)	(0.291)	(0.350)	(0.590)	(1.132)	(0.587)	(0.239)	(0.375)

	Baseline					EU (DE,ES,FR,IT,UK)				
VARIABLES	ΔLTD	ΔSTD	ΔTdebt	LTD Ratio	ΔTFA	ΔLTD	ΔSTD	ΔTdebt	LTD Ratio	ΔTFA
F_Equity	0.914***	0.333	1.290***	-0.013	0.551***	70.696***	33.873***	68.477***	0.052	13.683***
	(0.198)	(0.256)	(0.194)	(0.210)	(0.095)	(9.534)	(7.633)	(9.504)	(2.941)	(2.803)
F_ROE(0/1)	-0.234	-0.251	-0.170	-0.044	0.597	0.408	1.405*	0.855	0.093	1.102***
	(0.596)	(0.326)	(0.768)	(0.214)	(0.683)	(0.984)	(0.767)	(0.535)	(0.169)	(0.264)
Firm(0/1)										
F_lnTA(0/1)	-9.281	-5.674	-5.494	-2.883**	-2.929	-3.377*	-2.405*	-3.784**	-1.677***	0.761
	(5.903)	(3.525)	(4.635)	(1.098)	(2.387)	(1.825)	(1.276)	(1.697)	(0.540)	(0.839)
F_CurrRatio(0/1)	-9.073***	7.035**	3.678	4.479***	5.021*	-14.562***	0.353	-2.718	3.732***	2.115**
	(2.422)	(2.778)	(2.398)	(1.560)	(2.822)	(2.892)	(3.089)	(1.981)	(0.796)	(0.819)
F_Equity(0/1)	17.411**	5.771**	16.008***	-0.700	1.395	-2.687	-1.222	-3.019*	0.478	-2.144**
	(6.565)	(2.584)	(3.841)	(0.697)	(2.479)	(2.050)	(1.065)	(1.475)	(0.462)	(0.986)
F_ROE(0/1)	5.258	3.183	2.213	-0.189	3.471**	5.472***	2.625***	4.398***	1.161**	3.147***
	(4.280)	(2.872)	(2.446)	(1.515)	(1.701)	(1.393)	(0.819)	(1.175)	(0.417)	(0.963)
Observations	558,806	558,806	558,806	558,806	558,806	352,396	352,396	352,396	352,396	352,396
R-squared	0.407	0.529	0.396	0.770	0.434	0.446	0.443	0.397	0.816	0.434
Countries	9	9	9	9	9	5	5	5	5	5

Note: This table shows the estimation results for specification (CIQ 1) over the 2010-2017 period for the RBC reform. It considers both *persistent* effects of the announcement and legal framework implementation stages. Δ*LTD (*Δ*STD)* refers to the growth rated of long-term (short-term) debt, while Δ*Tdebt* indicates the growth rate of total debt. *LTD ratio* is used for the long-term debt ratio on levels and Δ*TFA* is the growth rate of total fixed assets, our proxy for investment. All columns include separate firm and country-by-time fixed effects, with standard errors being clustered at the country-by-sector level. ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively.

EU-member countries clearly drive the aggregate results before and after the reform. Specifically, in the post-reform period, better-capitalised and more profitable borrowers raise their long-term borrowing faster. Total fixed assets also grow at a faster pace, suggesting that more creditworthy borrowers use long-term funds to fund investments.

When turning to non-EU countries (CA, JP, US, KR), the previous findings disappear. It is however worth noting, that JP and the US did not adopt Basel III reforms for all banks in their banking system. By contrast, all EU countries in the sample apply Basel III reforms to their entire bank population.

When adding large firms to the estimation sample, the results on the creditworthiness hardly change. Estimations on this extended sample, however, suggest that firms with more liquid assets borrow less from banks after reforms entered into force.

In sum, the comparison suggests that the Basel III effects played out similarly for both SMEs and larger companies and that EU countries are clearly driving the overall results.

LCR reforms

For the LCR, in many of the considered countries, the announcement and the legal framework publication coincided, both taking place after the RBC stages. For this reason, the findings on the LCR effects partly replicate the persistent effects found for the RBC.

After the LCR announcement, better-capitalised firms exhibit more borrowing relative to their national competitors. Again, EU countries drive this finding.

When isolating EU countries, the results suggest that positive impact of firm capitalisation on long-term and total borrowing, lifts their investment rates. For more profitable firms, short-term funding seems more important, also boosting overall debt growth and investment. However, other concomitant factors like the ECB's unconventional monetary policy measures (or the SME support factor) might account for this finding.

Again, for the set of non-EU countries no significant patterns emerge**.** (Table 17)

Table 17

Estimation results on the LCR reform

	Baseline					EU (DE,ES,FR,IT,UK)				
VARIABLES	LTD	STD	Tdebt	LTD Ratio	TFA	LTD	STD	Tdebt	LTD Ratio	TFA
Reform#Firm(0/1)										
ANN(0/1)*F_lnTA(0/1)	0.044	1.165	-1.785	0.982*	-0.840	1.029	1.210*	0.372	0.818**	-0.504
	(1.602)	(0.844)	(1.417)	(0.581)	(1.383)	(0.887)	(0.591)	(0.947)	(0.319)	(0.536)
ANN(0/1)*F_CurrRatio(0/1)	-1.330	-0.528	-0.557	-0.717	1.304	-1.078	0.116	-1.741	-0.631	0.626
	(2.355)	(1.761)	(1.459)	(0.933)	(1.308)	(1.860)	(0.893)	(1.209)	(0.401)	(0.600)
ANN(0/1)*F_Equity(0/1)	1.319	0.384	3.448*	0.273	0.126	4.579***	0.169	3.683***	0.502	2.012***
	(3.083)	(1.293)	(1.732)	(0.604)	(1.509)	(1.382)	(1.155)	(1.154)	(0.380)	(0.461)
ANN(0/1)*F_ROE(0/1)	0.458	-1.670	0.444	-0.058	0.391	1.699	1.368*	1.327**	-0.081	1.558***
	(3.007)	(1.895)	(1.594)	(0.777)	(0.716)	(1.224)	(0.726)	(0.642)	(0.389)	(0.473)
Firm										
F_lnTA	-13.910***	-5.382**	-16.875***	-1.145	-17.945***	-18.308***	-14.378***	-21.281***	-1.129	-18.347***
	(1.726)	(2.004)	(1.415)	(0.734)	(1.600)	(1.321)	(1.482)	(1.764)	(1.102)	(1.563)
F_CurrRatio	-0.923	1.021**	0.572*	0.467	2.235***	-4.557***	0.018	-0.616	0.774***	1.763***
	(0.554)	(0.406)	(0.288)	(0.289)	(0.352)	(0.599)	(1.131)	(0.587)	(0.237)	(0.371)
F_Equity	0.934***	0.337	1.293***	-0.010	0.554***	70.605***	33.909***	68.500***	-0.049	13.667***
	(0.204)	(0.254)	(0.194)	(0.209)	(0.096)	(9.458)	(7.620)	(9.465)	(2.972)	(2.839)
F_ROE(0/1)	-0.192	-0.252	-0.168	-0.047	0.594	0.459	1.412*	0.875	0.099	1.114***
	(0.625)	(0.317)	(0.761)	(0.201)	(0.685)	(0.983)	(0.762)	(0.530)	(0.170)	(0.269)
Firm(0/1)										
F_lnTA(0/1)	-1.994	-4.733***	-1.739	-0.843	-3.220	-1.797	-3.103***	-2.790***	-1.048**	-0.604
	(2.391)	(1.576)	(1.343)	(0.977)	(1.989)	(1.350)	(0.919)	(0.819)	(0.429)	(0.709)
F_CurrRatio(0/1)	-13.261***	9.618***	1.845	3.143***	5.968***	-14.571***	1.402	-3.150	2.479***	3.612***

	Baseline					EU (DE,ES,FR,IT,UK)				
VARIABLES	LTD	STD	Tdebt	LTD Ratio	TFA	LTD	STD	Tdebt	LTD Ratio	TFA
	(2.451)	(3.168)	(1.849)	(0.810)	(1.545)	(3.286)	(2.743)	(1.983)	(0.596)	(0.656)
F_Equity(0/1)	15.639***	5.428***	15.455***	-1.087**	2.482	-0.836	0.586	-0.189	-0.058	-1.456**
	(4.455)	(1.394)	(2.717)	(0.516)	(1.901)	(1.363)	(0.905)	(1.311)	(0.254)	(0.628)
F_ROE(0/1)	3.696	4.374**	3.664**	0.455	3.592***	3.579***	2.703***	4.477***	0.718***	3.491***
	(3.187)	(1.752)	(1.630)	(0.846)	(1.003)	(0.967)	(0.487)	(0.582)	(0.221)	(0.339)
Observations	558,806	558,806	558,806	558,806	558,806	352,396	352,396	352,396	352,396	352,396
R-squared	0.407	0.529	0.396	0.770	0.434	0.445	0.443	0.397	0.816	0.434
Countries	9	9	9	9	9	5	5	5	5	5

Note: This table shows the estimation results for specification (CIQ 1) over the 2010-2017 period for the LCR reform. It considers only the *persistent* announcement effect as announcement and legal framework (almost) coincide in many jurisdictions and did not provide a sufficient number of observations to estimate the effects. Δ*LTD (*Δ*STD)* refers to the growth rated of long-term (short-term) debt, while Δ*Tdebt* indicates the growth rate of total debt. *LTD ratio* is used for the long-term debt ratio on levels and Δ*TFA* is the growth rate of total fixed assets, our proxy for investment. All columns include separate firm and country-by-time fixed effects, with standard errors being clustered at the country-by-sector level. ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively.

GSIB-DSIB framework

Evidence on the full set of countries suggests that the announcement of the GSIB-DSIB framework did not have any significant effects on SME financing (Table 18). However, when dropping the US and JP, significant effects emerge, again, in particular when studying EU countries in isolation. In fact, results on the EU subsample mirror the positive effect of creditworthiness on long-term borrowing and investment.

In the context of the GSIB-DSIB framework, structural differences in the banking systems across countries are likely to play an important role. Their market share in SME lending differs considerably (Refer to graphs 1 and 2 in the consultation report). The positive effect of firm profitability on borrowing, for instance, seems to be driven by Italian SMEs. Again, given the sequence of events, this analysis cannot fully tackle concerns that estimates may be co-driven by concomitant factors.

The analysis based on the full set of firms in all countries suggest that the smaller firms drive the significant positive effects of creditworthiness on the ability to raise funding at a faster pace after the reform implementation. One specific new finding arises for the full sample that captures smaller and larger firms: After the GSIB-DSIB announcement, it seems that firms with more liquid assets obtained less bank funding. This finding holds across maturities, in that such firms exhibit less short- and long-term borrowing.

Table 18

Estimation results on the G-SIB/D-SIB framework

	Baseline					EU (DE,ES,FR,IT,UK)				
VARIABLES	LTD	STD	Tdebt	LTD Ratio	TFA	LTD	STD	Tdebt	LTD Ratio	TFA
Reform#Firm(0/1)										
ANN(0/1)*F_lnTA(0/1)	-0.176	0.658	-2.112	0.977	-0.379	0.849	0.648	0.311	0.783**	-0.692
	(1.715)	(0.931)	(1.513)	(0.640)	(1.532)	(0.942)	(0.746)	(1.030)	(0.328)	(0.645)
ANN(0/1)*F_CurrRatio(0/1)	-1.648	-1.638	-0.294	-0.878	1.785	-2.051	-0.223	-1.559	-0.820	1.083
	(2.267)	(1.897)	(1.288)	(0.999)	(1.473)	(1.475)	(0.827)	(1.177)	(0.539)	(0.662)
ANN(0/1)*F_Equity(0/1)	1.295	1.620	3.023	0.328	-0.101	5.363***	0.898	4.048***	-0.048	1.740***
	(3.296)	(1.162)	(1.866)	(0.692)	(1.754)	(1.191)	(0.959)	(1.014)	(0.386)	(0.481)
ANN(0/1)*F_ROE(0/1)	0.408	-0.788	0.491	-0.153	0.513	2.009*	1.744*	1.831**	-0.233	1.336***
	(3.255)	(2.155)	(1.761)	(0.814)	(0.667)	(1.028)	(0.955)	(0.764)	(0.295)	(0.422)
Firm										
F_lnTA	-13.906***	-5.394**	-16.872***	-1.132	-17.949***	-18.299***	-14.388***	-21.293***	-1.114	-18.320***
	(1.723)	(2.008)	(1.421)	(0.735)	(1.593)	(1.317)	(1.474)	(1.739)	(1.095)	(1.571)
F_CurrRatio	-0.923	1.026**	0.574*	0.466	2.235***	-4.543***	0.019	-0.618	0.778***	1.764***
	(0.550)	(0.405)	(0.286)	(0.288)	(0.352)	(0.594)	(1.133)	(0.586)	(0.239)	(0.371)
F_Equity	0.934***	0.343	1.295***	-0.010	0.554***	70.549***	33.819***	68.408***	0.038	13.678***
	(0.205)	(0.254)	(0.196)	(0.211)	(0.096)	(9.449)	(7.608)	(9.442)	(2.951)	(2.826)
F_ROE(0/1)	-0.190	-0.272	-0.178	-0.047	0.596	0.429	1.403*	0.857	0.098	1.095***
	(0.606)	(0.327)	(0.757)	(0.209)	(0.691)	(0.986)	(0.767)	(0.531)	(0.170)	(0.266)
Firm(0/1)										
F_lnTA(0/1)	-1.866	-4.527***	-1.425	-0.902	-3.440	-1.837	-2.922***	-2.824***	-1.126**	-0.422
	(2.529)	(1.580)	(1.464)	(1.041)	(2.079)	(1.502)	(0.923)	(0.953)	(0.426)	(0.773)

F_CurrRatio(0/1)	-12.989***	10.295***	1.725	3.284***	5.602***	-13.832***	1.592	-3.028	2.677***	3.246***
	(2.334)	(3.166)	(1.849)	(0.887)	(1.686)	(3.161)	(2.756)	(2.090)	(0.663)	(0.807)
F_Equity(0/1)	15.577***	4.676***	15.492***	-1.122**	2.598	-1.900	0.107	-0.899	0.216	-1.531*
	(4.807)	(1.481)	(2.897)	(0.536)	(2.087)	(1.418)	(0.987)	(1.324)	(0.296)	(0.783)
F_ROE(0/1)	3.688	3.969*	3.599*	0.512	3.498***	3.151***	2.296***	3.986***	0.814***	3.423***
	(3.556)	(2.010)	(1.852)	(0.941)	(1.071)	(0.927)	(0.682)	(0.717)	(0.244)	(0.297)
Observations	558,806	558,806	558,806	558,806	558,806	352,396	352,396	352,396	352,396	352,396
R-squared	0.407	0.529	0.396	0.770	0.434	0.445	0.443	0.397	0.816	0.434
Countries	9	9	9	9	9	5	5	5	5	5

Note: This table shows the estimation results for specification (CIQ 1) over the 2010-2017 period for the G-SIB/D-SIB framework. It considers only the *persistent*announcement effect as announcement and legal framework (almost) coincide in many jurisdictions and did not provide a sufficient number of observations to estimate the effects. Δ*LTD (ΔSTD)* refers to the growth rated of long-term (short-term) debt, while Δ*Tdebt* indicates the growth rate of total debt. *LTD ratio* is used for the long-term debt ratio on levels and Δ*TFA* is the growth rate of total fixed assets, our proxy for investment. All columns include separate firm and country-by-time fixed effects, with standard errors being clustered at the country-by-sector level. ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively.

Leverage ratio

In mid-2015, the leverage ratio was almost jointly implemented across all sample countries except for Japan. There was no separate announcement stage and its late implementation again suggests that part of its effects could have already been captured by the previous analysis.

Again, significant differences between EU and non-EU countries help to explain why the full sample analysis is less conclusive (Table 19). Evidence on EU countries again suggests that better capitalized SMEs obtained more long-term and hence total funding, which goes along with higher investment levels. Also, more profitable firms seem to invest more, a result that is now broadly shared across all EU countries. When turning to SMEs in non-EU countries, better-capitalised firms exhibit a rather different response.

The share of long-term debt in total debt increases for better-capitalised SMEs in CA, KR, JP, US after the LR implementation. Interestingly, however, better capitalised SMEs in these countries invest relatively less. This finding clearly contrasts with evidence from EU countries. When adding large firms to SMEs in the full country sample, previous findings strengthen in significance.

Table 19

Estimation results on the Leverage ratio reform

	Baseline					EU (DE,ES,FR,IT,UK)				
VARIABLES	LTD	STD	Tdebt	LTD Ratio	TFA	LTD	STD	Tdebt	LTD Ratio	TFA
Reform#Firm(0/1)										
ANN(0/1)*F_lnTA(0/1)	2.403	2.446*	-0.780	0.996	-2.092	3.078***	1.772*	1.348	0.801*	-0.348
	(1.948)	(1.445)	(1.444)	(0.785)	(1.762)	(0.950)	(0.862)	(1.184)	(0.405)	(0.494)
ANN(0/1)*F_CurrRatio(0/1)	-0.769	0.145	-0.946	-1.108	2.646	-0.753	0.630	-1.306	-0.571*	1.520**
	(1.860)	(1.896)	(1.639)	(0.692)	(1.619)	(1.635)	(1.166)	(1.134)	(0.332)	(0.665)
ANN(0/1)*F_Equity(0/1)	-1.111	1.416	1.397	2.084**	-1.617	3.403**	-0.060	2.391**	0.646	1.097**
	(3.044)	(1.649)	(1.391)	(1.009)	(1.255)	(1.622)	(1.104)	(0.998)	(0.414)	(0.409)
ANN(0/1)*F_ROE(0/1)	-0.424	0.413	-0.679	0.386	1.510**	0.541	1.108	0.493	-0.125	1.675***
	(2.473)	(1.971)	(1.238)	(0.974)	(0.561)	(1.295)	(0.841)	(0.868)	(0.480)	(0.326)
Firm										
F_lnTA	-13.921***	-5.479***	-16.847***	-1.176	-17.920***	-18.224***	-14.363***	-21.220***	-1.132	-18.350***
	(1.726)	(1.994)	(1.405)	(0.726)	(1.589)	(1.324)	(1.481)	(1.799)	(1.112)	(1.577)
F_CurrRatio	-0.924	1.021**	0.571*	0.468	2.233***	-4.560***	0.010	-0.616	0.772***	1.753***
	(0.551)	(0.404)	(0.287)	(0.283)	(0.353)	(0.600)	(1.131)	(0.586)	(0.235)	(0.373)
F_Equity	0.930***	0.345	1.290***	-0.007	0.558***	71.000***	33.968***	68.776***	-0.050	13.778***
	(0.201)	(0.254)	(0.194)	(0.211)	(0.095)	(9.648)	(7.626)	(9.533)	(2.983)	(2.838)
F_ROE(0/1)	-0.182	-0.269	-0.169	-0.056	0.597	0.452	1.411*	0.867	0.098	1.127***
	(0.621)	(0.310)	(0.759)	(0.200)	(0.686)	(0.981)	(0.760)	(0.533)	(0.168)	(0.268)
Firm(0/1)										
F_lnTA(0/1)	-2.768	-5.012***	-2.372*	-0.664	-3.021	-2.385*	-3.156***	-3.072***	-0.935**	-0.734
	(2.178)	(1.631)	(1.289)	(0.840)	(1.838)	(1.373)	(0.933)	(0.746)	(0.396)	(0.650)

	Baseline					EU (DE,ES,FR,IT,UK)				
F_CurrRatio(0/1)	-13.663***	9.289***	1.899	3.128***	5.744***	-14.808***	1.248	-3.521*	2.380***	3.366***
	(1.948)	(2.916)	(1.833)	(0.524)	(1.389)	(3.000)	(2.791)	(1.858)	(0.573)	(0.671)
F_Equity(0/1)	16.780***	5.077***	16.867***	-1.683**	3.053**	0.183	0.688	0.755	-0.050	-0.901
	(3.793)	(1.666)	(2.536)	(0.718)	(1.405)	(1.443)	(0.786)	(1.378)	(0.203)	(0.604)
F_ROE(0/1)	4.030*	3.381**	4.072***	0.328	3.287***	4.197***	2.974***	4.934***	0.727***	3.639***
	(2.216)	(1.374)	(1.306)	(0.789)	(0.913)	(1.060)	(0.406)	(0.681)	(0.234)	(0.292)
Observations	558,806	558,806	558,806	558,806	558,806	352,396	352,396	352,396	352,396	352,396
R-squared	0.407	0.529	0.396	0.770	0.434	0.445	0.443	0.397	0.816	0.434
Countries	9	9	9	9	9	5	5	5	5	5

Note: This table shows the estimation results for specification (CIQ 1) over the 2010-2017 period for the Leverage ratio reform. It considers only the *persistent* announcement effect as announcement and legal framework (almost) coincide in many jurisdictions and did not provide a sufficient number of observations to estimate the effects. Δ*LTD (*Δ*STD)* refers to the growth rated of long-term (short-term) debt, while Δ*Tdebt* indicates the growth rate of total debt. *LTD ratio* is used for the long-term debt ratio on levels and Δ*TFA* is the growth rate of total fixed assets, our proxy for investment. All columns include separate firm and country-by-time fixed effects, with standard errors being clustered at the country-by-sector level. ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively.

2.2.5 Conclusions

The findings suggest that Basel III regulatory reforms reinforce the impact of specific SME characteristics—namely the creditworthiness of firms-- that had proven beneficial to access bank funding before the reforms entered into force. The goal of this study is to complement other pieces of the analysis by looking at real sector outcomes in terms of firms' debt and investment. Firm-level heterogeneity and cross-country differences in the implementation stages serve as key identification devices.

The focus of this cross-country study lies on the RBC effects, implicitly acting as a placeholder for the full set of Basel III reforms. From a cross-country perspective, the results show that more creditworthy borrowers exhibit higher growth rates of total bank debt and investment. In particular, better capitalised and more profitable firms find it easier to obtain long-term loans after the legal framework of the RBC reform had been nationally implemented. Further, when comparing SMEs with larger companies, the analysis finds similar effects. EU-member countries clearly drive the results as evidence from JP and the US is inconclusive. It is worth noting, however, that JP and the US did not adopt Basel III reforms for all banks in their banking system.

2.3 ECB, SAFE data analysis

The exercise ran by the ECB is a cross-country study that analyses the perception of firms on access to bank funding, which complements the bank-firm level analysis based on credit registers. This analysis on the euro area is based on the "Survey on the Access to Finance of Enterprises (SAFE)" that is conducted on a bi-annual basis since 2009 by the European Central Bank (ECB) and the European Commission (EC). The survey covers developments in the financial situation of enterprises and trends in the need for and availability of external financing, asking enterprises a standardised set of questions on their funding needs and financial constraints during the six months under study. The sample is broken down by firm size, with each period including micro, small, medium-sized and large firms in the countries under consideration. Most of the firms are interviewed only once, but there is a subsample of firms present in several periods. Firm-level responses are complemented with firm-level and bank-level financial data and identification is based on firm- and bank-level heterogeneity.

2.3.1 Data description

The confidential non-anonymised ECB SAFE dataset at the firm-level is complemented with quantitative information on firm balance sheets and income statements included in the Amadeus dataset, which is a proprietary database maintained by Bureau van Dijk (BvD). This firm-level dataset is then augmented with bank-level information on the firm's main lender, obtained from three datasets: (1) confidential supervisory reporting data (2) public data available from the EBA Transparency Exercises and Stress Tests and (3) balance sheet and income statement information from BankFocus. An overview of the various data sets used for the analysis is provided in Table 20.

Table 20

Datasets used for ECB's the empirical analysis

Data Sources	Frequency	Period	SME Definition
SAFE matched with firm balance sheet information from BvD Amadeus	Semi-annual	2009H1-2016H2	Employees & Turnover
Supervisory data	Quarterly	2014Q1-2018Q2	-
EBA (public data from Transparency Exercise and Stress Test)	Semi-annual	12/2012-12/2013	-
BankFocus	Annual	2009-2018	-

The final sample for the empirical analysis contains information on 7,802 matched firm-bank observations, covering SMEs in eight euro area countries (Austria, France, Germany, Greece, Ireland, Netherlands, Portugal, and Spain). A breakdown of these observations by country is provided in Table 21. Remaining euro area countries needed to be excluded from the analysis, either because observations for those countries were only available in some but not all survey waves or because information on firms' lenders was not available.

Table 21

Number of observations in ECB estimation sample, by country (from 2011-2016)

Country	Firms	SMEs
AT	376	268
DE	923	663
ES	2,894	2,509
FR	2,557	2,185
GR	345	324
IE	216	201
NL	218	170
PT	1,622	1,482
Total	**9,151**	**7,802**

Source: ECB SAFE survey

Table 22 presents summary statistics for the dependent variable and the firm and bank controls in the estimation sample. The main sample includes 7,802 firm-year observations. This includes 3,195 unique SMEs (around half of all SMEs were observed more than once in the survey). The dependent variable in the empirical analysis, *Credit Constrained*, is a binary variable equal to 1 if either of the following four conditions applies: (1) the firm's application for a bank loan or

a credit line in the past 6 months was denied; (2) the firm received less than 75% of the amount it requested; (3) the firm refused the loan offer because the rate was too high; (4) the firm did not apply for a loan or credit line because it feared a rejection. The variable is equal to zero if none of the aforementioned conditions applies for the firm. As illustrated in Figure 8, 13 percent of the firms in the sample were credit constrained on average. Moreover, Figure 8 shows that overall access to finance for SMEs has significantly improved in the past few years, with the share of constrained firms declining from around 17.5 percent in 2012h1 to around 9 percent 2016h2.

In order to reduce the sensitivity of the regressions to outliers, the explanatory firm-specific variables are winsorised at the 1% level in each tail. We hence assign all values to the 1 and 99-percentile of the individual distribution, if the values lie either above the upper, or below the lower threshold in the distribution of all firms. Firm-specific control variables include the firm's total assets, the current ratio (Current Assets/Current Liabilities), the return on equity, the debt to equity ratio and the interest coverage ratio (EBIT/interest paid). Moreover, to control for differences across banks the analysis includes the bank's total assets, the bank's ROE, the equity/assets ratio, the Tier 1 ratio and the liquid assets/ total assets ratio.

Table 22

Descriptive Statistics

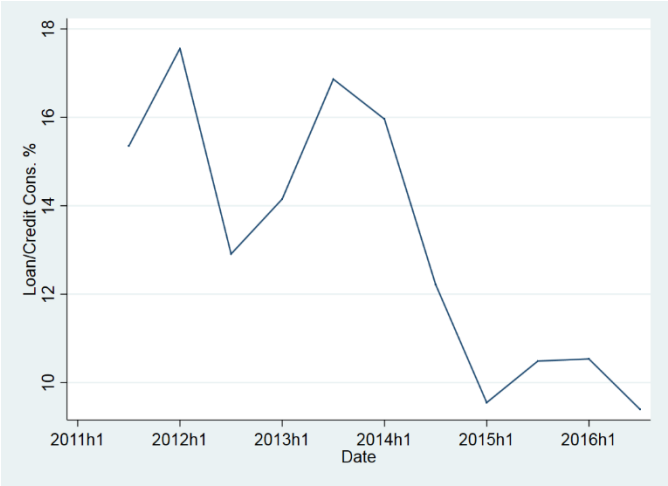
	N	mean	min	max	sd
Dependent Variable					
Credit constrained %	7802	13	0	100	33
Firm Controls					
Current ratio	7802	1.99	0.08	25.03	2.21
ROE %	7802	5.34	-376.92	250	51.67
Debt/Equity %	7802	143.91	0.08	3901.37	375.81
Log(Total Assets)	7802	8.33	3.75	12.70	1.47
Interest Coverage Ratio	7802	15.59	-95	652.25	68.00
Bank Controls					
Equity/Assets %	7802	6.03	-3.9	66.70	2.62
Tier1 Ratio %	7802	12.16	-6.0	68	2.37
Liquid Assets/Total Assets %	7802	19.15	0.2	53.65	14.15
ROE %	7802	2.23	-266.6	4704.64	78.62
Log(Total Assets)	7802	12.52	4.4	14.59	1.61

Sources: ECB SAFE survey and supervisory bank-level data, BvD Amadeus database, EBA, Bank Focus.

SMEs reporting to be credit-constrained, out of all SMEs surveyed, in percent

Figure 8

In percent



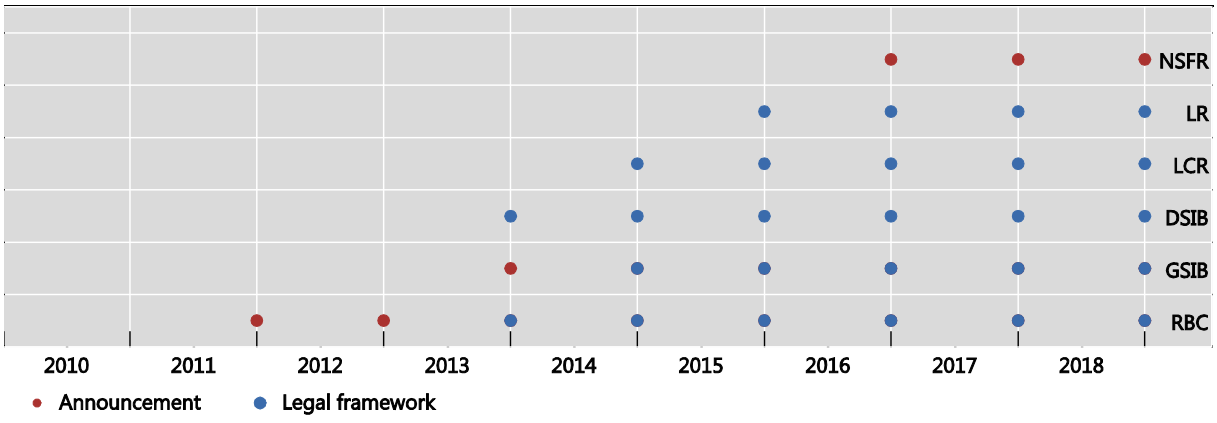
Source: ECB SAFE.

Considered Reforms

The analysis considers the effects of the implementation of the risk-based capital (RBC) reforms, the introduction of the Leverage Ratio (LR), the Liquidity Coverage Ratio (LCR) and finally the G-SIB framework. The analysis of the announcement of RBC reforms (2011h1) and the NSFR (2016) is not possible, as the dataset is not long enough before and after the announcement, respectively. Moreover, the D-SIB framework in the EU was implemented at the same time as the G-SIB framework and is therefore not analysed separately. For each of these reforms, dummy variables are created that switch from 0 to 1 in the period where the reforms were either announced or fully implemented. Figure 9 provides an overview of the relevant dates.

Risk-based capital ratio (RBC) implementation stages: European Union

Figure 9



Note: This figure shows two of the national implementation stages as described in the BCBS' RCAP implementation assessment. The link to the underlying public reports is: https://www.bis.org/bcbs/publ/d452.htm.

Source: BCBS

2.3.2 Empirical Specification

The identification strategy employed for the analysis of the SAFE data is similar to the other centralised and satellite analyses in the report, apart from the difference in the dependent variable. In particular, banks are grouped into those that were more and those that were less affected by a specific reform (based on their initial balance sheet characteristics), and the analysis tests whether access to finance for firms borrowing from either group was differentially affected by the reform. For example, for the risk-based capital reforms, relatively weakly capitalized banks are assumed to be more affected by the reform. To identify these more affected banks, banks were sorted by their pre-reform capital positions relative to their peers in the euro area, and those belonging to the lower end of the distribution were considered as being more affected.

In particular, to test whether there was a stronger effect of the reforms on firms borrowing from banks that were relatively more affected by the reforms, regressions of the following type are estimated:

Persistent effects on SME access to finance

$$Y_{f,t} = \beta\ Bank(0/1)_{b,pre} + \beta_{RB}\left(Bank(0/1)_{b,pre} * PostReg_t\right) + \beta_F C\_Firm_{f,t-1} + \beta_B C\_Bank_{b,t-1} + FE(c,t) + \varepsilon_{f,t} \quad \text{(ECB 1)}$$

where a description of all variables is included in the box below. The variable of interest in the regression is the interaction between the post reform dummy (PostReg) and the dummy variable indicating bank exposure to the reforms. The latter is equal to one whenever the Tier1 / RWA (for RBC reforms), the ratio of liquid assets/total assets (for LCR) and the Tier 1 capital/total assets (for the Leverage Ratio) are in the bottom decile, quartile or half of the distribution, or when the firm's lender is a G-SIB (for G-SIB reforms).

In addition, to investigate whether the effects of the reforms are temporary or persistent, regressions of the following type are also estimated:

Temporary effects on SME access to finance

$$Y_{f,t} = \beta\ Bank(0/1)_{b,pre} + \sum_{k=0}^{K}\left(\beta_{RBk}^{A} Reg_{t-k}^{temp} * Bank(0/1)_{b,pre}\right) + \beta_F C\_Firm_{f,t-1} + \beta_B C\_Bank_{b,t-1} + FE(c,t) + \varepsilon_{f,t} \quad \text{(ECB 2)}$$

where the $PostReg_{t-k}^{temp}$ dummy is equal to 1 only in period t-k and zero in every other period.

In the first specification, the coefficient β_{RB} captures the average effect of the reform in the post-reform period (since the $PostReg_t$ dummy is equal to 1 for the post-reform period). By contrast, in the second specification, the coefficient β_{RBk}^{A} captures the impact of the reform only in period t-k.

$Y_{f,t}$	constrained dummy for firm *f*
Reg_t	regulation dummy (LR, LCR, RBC, GSIB)
$\sum Reg_{t-k}$	lagged regulation dummy (LR, LCR, RBC, GSIB)
$Bank(0/1)_{b,pre}$	bank *b*'s characteristics targeted by regulation, dummy fixed pre-regulation
$C\_Firm_{f,t-1}$	ln size, current ratio, equity ratio, ROE as continuous controls, lagged by 1 year
$C\_Bank_{b,t-1}$	ln size, ROE, equity/assets, tier 1 ratio, liquid assets/total assets as continuous controls lagged by 1 year
$FE(c,t)$	Separate country and time fixed effects
$FE(c\#t)$	Country-by-time fixed effects

2.3.3 Results

The following tables present an overview of the results of the cross-country exercise ran by the ECB. For the regulations studied, coefficients for the interaction term between the reform dummy and the bank exposure variable are significant for only some specifications for the RBC reforms. In particular, the first two columns of Table 23 show that firms borrowing from the most affected banks (i.e., those in the bottom decile of the initial capital ratio distribution) are more likely to be credit constrained after the reform (as shown by the positive coefficient), relative to firms borrowing from less affected banks. Results become insignificant when defining the most affected banks as those in the lowest quartile (p25) or half (p50) of the capital ratio distribution (see Table 23, columns 3-6). Moreover, Table 24 shows that the relative slowdown in access to credit for firms borrowing from the most constrained banks is temporary, i.e. only present in the first two years after reform implementation (columns 1-2). In subsequent years there is no significant difference between firms borrowing from more or less affected banks; moreover, there is no significant difference when considering different definitions of bank exposure (columns 3-6).

To note, regression coefficients for the firm and bank control variables are in line with expectations and in some cases significant. In particular, firms with higher ROE ratios and interest coverage ratios are less likely to be credit constrained, while firms with higher debt/equity ratios are more likely to be constrained. Moreover, firms borrowing from more profitable banks (higher ROE) are also less likely to be credit constrained. These results are very stable across the different specifications and reforms analysed.

Coefficients for the interaction terms are mostly insignificant for the other reforms that have been analysed, which indicates that these reforms did not have a differential impact on firms borrowing from banks regardless of whether they more or less affected by the respective reform. In particular, the interaction terms in all of the specifications testing for persistent effects are insignificant.

Table 23

Results for the persistent effect of RBC with "initial" exposures, for different bank rankings

	p10		p25		p50	
VARIABLES	(1) Credit Constr.	(2) Credit Constr.	(3) Credit Constr.	(4) Credit Constr.	(5) Credit Constr.	(6) Credit Constr.
Bank(0/1)*LegalFramework_t	0.145***	0.219***	0.028	0.023	-0.024	-0.034
	(0.045)	(0.076)	(0.025)	(0.023)	(0.022)	(0.024)
Bank(0/1)	-0.118*	-0.146*	-0.049	-0.046	0.017	0.029
	(0.062)	(0.082)	(0.030)	(0.028)	(0.023)	(0.025)
FIRM CONTROLS						
Curr Ratio	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
ROE	-0.051***	-0.048***	-0.051***	-0.048***	-0.050***	-0.048***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Debt/Equity	0.010***	0.011***	0.010***	0.011***	0.010***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Log(TotalAssets)	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Interest Coverage	-0.018***	-0.018***	-0.018***	-0.018***	-0.018***	-0.018***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
BANK CONTROLS						
Log(TotalAssets)	0.423	0.448	0.109	0.139	0.324	0.416
	(0.545)	(0.604)	(0.634)	(0.714)	(0.578)	(0.630)
ROE	-0.004***	-0.003**	-0.003**	-0.002**	-0.003**	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Equity/Assets	-0.344	-0.533	-0.158	-0.524	-0.079	-0.520
	(0.491)	(0.518)	(0.434)	(0.495)	(0.430)	(0.497)

	p10		p25		p50	
VARIABLES	(1) Credit Constr.	(2) Credit Constr.	(3) Credit Constr.	(4) Credit Constr.	(5) Credit Constr.	(6) Credit Constr.
Tier 1 Ratio	-0.340	0.066	-0.290	0.052	-0.283	0.057
	(0.373)	(0.319)	(0.367)	(0.296)	(0.412)	(0.362)
Liquid/Total	0.155*	0.168*	0.178*	0.184*	0.184**	0.176*
	(0.085)	(0.087)	(0.089)	(0.094)	(0.090)	(0.094)
Observations	7,117	7,117	7,117	7,117	7,117	7,117
R-squared	0.064	0.076	0.064	0.075	0.064	0.075
Time FE	YES	NO	YES	NO	YES	NO
Country FE	YES	NO	YES	NO	YES	NO
Country*Time FE	NO	YES	NO	YES	NO	YES

Note: This table shows the estimation results for specification (ECB 1) over the 2011-2016 period for the RBC reform. Columns 1, 3 and 5 include separate country and time fixed effects, while columns 2, 4 and 6 draw on country-by-time fixed effects. Standard errors are clustered at the country level. ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively.

Table 24

Results for the temporary RBC effect with "initial" exposures, for different bank rankings

	p10		p25		p50	
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Credit Constr.	Credit Constr.	Credit Constr.	Credit Constr.	Credit Constr.	Credit Constr.
Bank(0/1)*LegalFramework_t	0.144***	0.265***	0.016	-0.012	-0.045	-0.075**
	(0.035)	(0.059)	(0.031)	(0.025)	(0.027)	(0.036)
Bank(0/1)*LegalFramework_t-1	0.156**	0.210**	0.043	0.023	-0.021	-0.046
	(0.068)	(0.085)	(0.038)	(0.037)	(0.028)	(0.028)
Bank(0/1)*LegalFramework_t-2	-0.091	-0.052	0.016	0.038*	-0.020	0.005
	(0.074)	(0.084)	(0.024)	(0.019)	(0.021)	(0.022)
Bank(0/1)*LegalFramework_t-3	0.043	0.165*	0.036	0.044	-0.013	-0.026
	(0.104)	(0.091)	(0.038)	(0.040)	(0.021)	(0.027)
Bank(0/1)	-0.110	-0.147*	-0.050*	-0.046	0.016	0.031
	(0.067)	(0.082)	(0.028)	(0.028)	(0.023)	(0.025)
FIRM CONTROLS						
Curr Ratio	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
ROE	-0.051***	-0.049***	-0.051***	-0.048***	-0.050***	-0.047***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Debt/Equity	0.011***	0.011***	0.010***	0.011***	0.011***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Log(TotalAssets)	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)

Interest Coverage	-0.018***	-0.018***	-0.018***	-0.018***	-0.018***	-0.018***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
BANK CONTROLS						
Log(TotalAssets)	0.411	0.430	0.127	0.143	0.311	0.404
	(0.553)	(0.609)	(0.643)	(0.718)	(0.582)	(0.631)
ROE	-0.004***	-0.003**	-0.003**	-0.002**	-0.003**	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Equity/Assets	-0.374	-0.551	-0.203	-0.519	-0.082	-0.495
	(0.549)	(0.518)	(0.481)	(0.498)	(0.435)	(0.512)
Tier 1 Ratio	-0.348	0.088	-0.314	0.046	-0.287	0.162
	(0.391)	(0.325)	(0.376)	(0.294)	(0.429)	(0.348)
Liquid/Total	0.154*	0.168*	0.174*	0.180*	0.181*	0.171*
	(0.087)	(0.087)	(0.092)	(0.094)	(0.090)	(0.095)
Observations	7,117	7,117	7,117	7,117	7,117	7,117
R-squared	0.064	0.076	0.064	0.075	0.064	0.076
Time FE	YES	NO	YES	NO	YES	NO
Country FE	YES	NO	YES	NO	YES	NO
Country*Time FE	NO	YES	NO	YES	NO	YES

Note: This table shows the estimation results for specification (ECB 2) over the 2011-2016 period for the RBC reform. Columns 1, 3 and 5 include separate country and time fixed effects, while columns 2, 4 and 6 draw on country-by-time fixed effects. Standard errors are clustered at the country level. ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively.

Robustness and further tests

Apart from the baseline specifications reported above, a number of additional tests and robustness checks are also performed. The first one is to split the sample into commercial and non-commercial banks based on Bank Focus categorisation. In this case, the RBC results for commercial banks are similar to those in the baseline specification while there are no significant effects for non-commercial banks.

A second split of the sample is into crisis and non-crisis countries, where crisis countries are those severely affected by the sovereign debt crisis and non-crisis countries, those that were less affected. The negative impact of the RBC reform on firms borrowing from the most affected banks relative to firms borrowing from less affected banks is observed only in the crisis countries. Furthermore, the effect vanishes completely if specific crisis-hit jurisdictions are excluded from the analysis.

For baseline specifications constrained banks are defined relative to their peers in the whole sample, i.e. defined as constrained when they are in the bottom quartile of the distribution for all eight countries. In an alternative specification, banks' reform exposure is defined relative to the other banks within the same country (that is, with respect to country-specific rather than sample-wide distributions). Using this alternative exposure definition, regression coefficients for the interaction term on RBC, LR and LCR reforms are mostly insignificant.

Finally, the ECB analysis tests whether firms with different characteristics were differentially affected by the reforms, similar to what has been done in the Capital IQ analysis (see Section 2.2). Findings do not indicate any differential impact of the implementation of the RBC legal framework on credit access by SMEs that differ in terms of profitability, size, leverage, current ratio or interest coverage ratio.

2.3.4 Conclusions

For the regulations studied (RBC, Leverage Ratio, G-SIB regulation, LCR) the analysis does not identify any significant negative persistent impact of the reforms on SME access to finance. In a few cases, there is a significant temporary effect for firms borrowing from the most affected banks; however, this finding is not robust. In particular, for the RBC reforms, SMEs borrowing from banks in the bottom decile of the initial capital ratio distribution become more constrained in the first two years after the reforms, relative to firms borrowing from better capitalised banks. This effect disappears, however, when looking at the bottom quartile or the bottom half of the capital ratio distribution. Moreover, it also vanishes when defining constrained banks relative to their peers within the same country, rather than at the euro- area level.

For the other reforms under consideration, i.e. the Leverage Ratio, the Liquidity Coverage Ratio and the G-SIB reforms, the analysis does not reveal any significant difference in the impact on the access to finance for firms borrowing from banks that were more or less affected by the reforms.

2.4 BCBS Analysis

Based on data collected from the Basel Committee's quantitative impact studies (QIS), the Basel Committee on Banking Supervision (BCBS) analysed the effect of recently implemented regulatory reforms on SME lending.

This cross-country study complements the FSB analysis along two dimensions using the Committee's QIS data. As its first key contribution, this analysis uses information on banks' capital shortfall and capital surplus from QIS data as the relevant measure of bank's ex ante exposure to the Basel III reforms. Second, it is a cross-country study at the level of individual banks. Empirical work focuses on the largest banks in each Basel Committee member jurisdiction and hence draws inference from a sample of internationally active banks that are all subject to the Basel regulatory standards and exposed to a variety of macroeconomic conditions.

This reform exposure measure differs from the balance sheet characteristics explored elsewhere in the FSB report. It reflects the additional capital a bank would need (or has in excess) in order to fully comply with all Basel III reforms in the future and any national reforms that go beyond the internationally agreed minimums. Thereby, it captures how RWAs are calculated, new definitions of eligible capital, increases in minimum capital requirements, G-SIB capital buffers, targeted capital conservation buffers, the leverage ratio minimum requirements and the output floor.

The identification of reform effects first draws on differences in the reform implementation status across countries, and, second, on differential exposures at the individual bank level. Potentially confounding demand effects are absorbed by country-by-time fixed effects.

Relative to the exposure measures used elsewhere in the report, this exposure measure can take excessive RWA variability into account. In fact, identifying the relevant group of the potentially most exposed banks plays an important role in the assessment of how reform effects play out. A comparison group of totally unaffected banks is not available in any case. As in other parts of the FSB analysis, the group of most exposed banks is identified based on their pre-reform exposure measure and kept constant over the post reform period. The legal framework implementation of the RBC reform features as the relevant proxy for the overall impact of Basel III reforms.

The analysis does not find evidence, that the RBC reform adversely affected SME lending. The RBC reform acts as a proxy that also covers the G-SIB surcharge and the recently implemented leverage ratio requirements. Reform effects on both SME lending growth rates and the share of SME lending[21] reveal to be insignificant from a transitory or persistent perspective.

2.4.1 Basel framework SME definition

The Basel framework defines small and medium-sized entities as firms with reported annual sales of less than or equal to €50 million for the most recent financial year. Loans that meet

[21] The QIS definition is "exposures", which activities beyond lending. For example, exposures includes any SME guarantees, lines of credit or other extension or supports for credit activities. In order to maintain consistency with other parts of the report, "lending" will be used instead of "exposures" in this section. For further information about QIS collections, see https://www.bis.org/bcbs/qis/.

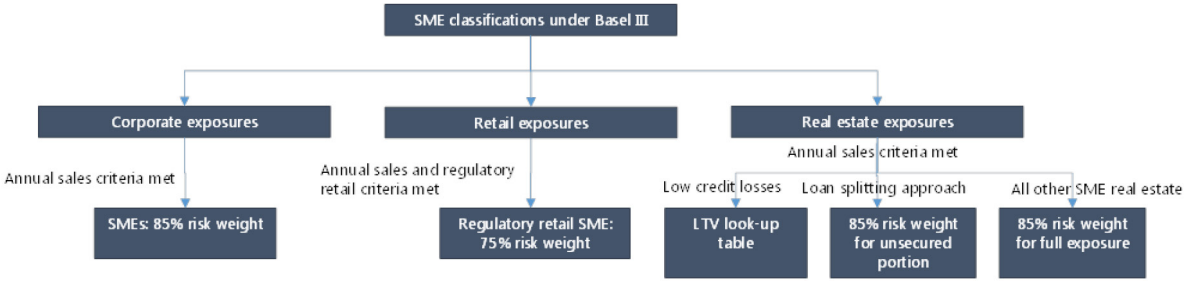
both the retail and SME definitions are designated SME retail loans;[22] otherwise, they are treated as SME corporate loans.[23]

Jurisdictions have the option to exercise national discretion in defining SMEs. In some jurisdictions (e.g. emerging economies), national supervisors might deem it appropriate to define SMEs in a more conservative manner (i.e. with a lower level of sales).[24] Also subject to national discretion, supervisors may allow banks to substitute total assets of the consolidated group for total sales in calculating the SME threshold and the firm-size adjustment. However, total assets should be used only when total sales are not a meaningful indicator of firm size.[25]

A summary of the SME criteria and associated risk-weights is illustrated in the flowchart below (Figure 10). Under Basel III, SME lending is separated into corporate, retail, and real estate lending. Based on annual sales criteria, regulatory retail criteria, and regulatory approaches, SME loans receive different risk weights.

QIS SME flowchart

Figure 10



Source: BCBS.

It is important to note that SME retail refers to business lending (and not to credit to individuals), even though they are managed as retail loans. However, for QIS purposes these are classified as other retail SME. Also, there are likely SME loans that end up in other loan types, such as residential real estate lending, which cannot be readily identified as SME loans.

2.4.2 Data description

This analysis draws on 94 banks in 18 jurisdictions, which are considered to be representative of the largest banks in each of these countries. The dataset[26] covers the period of 2011-18, as

[22] The retail definition has three criterion: product, low value of exposures, and granularity. See Basel 2 paragraph 70 and Basel III paragraph 55.

[23] In Basel II, "standardised retail" uses the term "small business" but does not define it; for "standardised corporate", there is no SME definition. In Basel II, SME is defined in the IRB section. Under Basel III, SME is defined in the IRB section, and the standardised approach points to the IRB SME definition. There are no changes in the definition of SME in Basel III from Basel II.

[24] This is new to the Basel III text; see paragraph 54, footnote 31.

[25] See Basel II, paragraph 274 and Basel III, paragraph 55.

[26] QIS data that is collected from BCBS member jurisdictions on a biannual basis. Due to confidentiality agreements, individual banks cannot be identified in the data.

data on SME credit was not readily available before 2011. Data on corporate SME lending was collected from a larger sample of banks than retail SME loans which rationalises this study's isolated focus on corporate SME lending.

A summary of these data, which includes retail SME loans, is provided in Table 25. The simple average across jurisdictions for the share of SME lending (retail lending plus corporate lending) to total credit amounts to around 10 percent, while that for corporate SME lending is about 5 percent.

Table 25

Shares of SME lending relative to total credit (in %)*

	Corporate		Retail	
Country	**2011-2012**	**2013-2018**	**2011-2012**	**2013-2018**
Australia	7.8	6.1	1.9	2.1
Belgium	7.9	9.2		6.8
Brazil		1.4		0.6
Canada	4.0	4.8	1.1	0.7
China		9.7		
France	3.7	3.7	5.6	6.0
Germany	2.9	3.9	1.3	1.5
Italy		10.8	5.7	5.3
Japan	4.3	1.8		
Netherlands	9.0	7.8	4.8	4.4
Singapore		2.9		1.4
South Africa		7.2		4.9
Spain	4.2	4.2	1.2	3.1
Sweden		12.9		2.3
Turkey		9.2		6.5
United Kingdom		1.7	0.8	1.1
United States**	3.5	3.2		

Source: BCBS.
Note: for confidentiality reasons, Luxembourg is not shown.
* Shares of SME lending represents the average of SME lending of the selected international banks (including lending to non-residents) in particular country weighted by the banks' total credit. For the US, the average is weighted by total lending.
** SME lending for the US is proxied by the amount of small loans (under $ 1 million) that banks provided to corporates.

2.4.3 Adjustments and data cleaning procedure

Several steps were taken to prepare the QIS data for the empirical analysis. Banks that did not report information for three consecutive time periods were dropped from the sample. To ensure cross-border and time consistency in the variables, nominal variables were deflated by the GDP deflator of the bank's respective country. Further, corporate SME lending has been winsorised at the 5% level, while all other variables have been winsorised at the 1% level in each tail. In a limited number of cases, some bank-level observations have been linearly interpolated to fill in missing values.

2.4.4 Empirical Specification

The empirical analysis tests whether the cohort of banks that was most exposed to the RBC reform ex ante reduced SME lending (either total SME lending or as a share of total credit) after the reform's implementation. Specification (BCBS1) considers the *transitory* effects with *b* representing the individual bank, *t* time and *c* the country, respectively.

$$y_{c,b,t} = \alpha + \sum_{k=0}^{5} \beta_k^{trans} \left(Post(0/1)_{t-k,c}^{trans} \times Bank(0/1)_{b,pre} \right) + \gamma\, Controls_{b,t-1} + FE(c\#t) + FE(b) + \varepsilon_{c,b,t} \qquad \textit{(BCBS1)}$$

Specification (BCBS2) estimates potential *persistent* effects

$$y_{b,c,t} = \alpha + \beta^{pers} \left(Post(0/1)_{c,t}^{pers} \times Bank(0/1)_{b,pre} \right) + \gamma\, Controls_{b,t-1} + FE(c\#t) + FE(b) + \varepsilon_{c,b,t} \qquad \textit{(BCBS2)}$$

$y_{c,b,t}$	Dependent variable for bank *b* that is located in country *c* at time *t*. The dependent variable is either (i) SME lending growth or (ii) SME lending as a share of total credit.
β^{pers}	Coefficient estimate that reflects the persistence differences exhibited by the most reform-exposed banks after RBC implementation.
$Post(0/1)_{c,t}^{pers}$	Persistent RBC indicator function for country *c* at time *t*. The indicator switches to one for all periods after the legal framework implementation.
$Post(0/1)_{t-k,c}^{trans}$	Transitory RBC indicator function. The indicator switches to one if the legal framework hat been implemented in period t-k for country c.
$Bank(0/1)_{b,pre}$	Indicator function for the most exposed banks, defined as banks whose capital shortfall measure falls in the 25th quantile before reform implementation on average. 23 banks enter this group.
$\gamma\, Controls_{b,t-1}$	Lagged bank control variables (e.g. log of size, loan-to-asset, deposit-to-asset, NPL ratio, RBC and LCR ratio, ROE, operating income etc.)
$FE(c\#t)$	Country-by-time fixed effects.
$FE(b)$	Bank fixed effects

Differences across individual country's RBC implementation schedules, and heterogeneity in banks' capital shortfall measure (as a proxy for their ex ante reform exposure) serve as key tools in the identification strategy. To disentangle demand and supply effects, country-by-time fixed effects are used, which also absorb any potentially confounding macro factors.

Summary statistics for the empirical dataset are presented in Table 26. The median SME credit growth rate is 1.6% and the median share of SME lending to total corporate credit is around 5%.

Table 26

Summary statistics for the analysis data set

Variables	Observations	Mean	Standard Deviation	Median
SME lending growth	988	1.6	9.6	1.0
SME lending to total corporate credit	1004	7.1	6.2	5.2
RWA density	1082	35.0	11.6	34.4
LCR	1082	133	70	124
NSFR	1082	105	17	105
ROA	1082	0.31	0.33	0.26
Log of leverage ratio exposure	1082	13.6	2.1	13.6

Note: observations are expressed in percent, except for the leverage ratio exposure.
Source: BCBS.

2.4.5 Results

Results suggest that there was no significant impact for the most exposed banks as defined by their ex ante *capital shortfall* measure (Table 27). Neither the persistent nor transitory effects yield significant results. This analysis does not find evidence that the recently implemented Basel III set of regulations (including the G-SIB surcharge), which is proxied by RBC reforms in this analysis, adversely affected SME lending at the most exposed banks.

Table 27

Effect of the RBC reform on SME lending

Dependent variable	**SME exposure growth**		**SME share to total credit**
Model specification	Persistent	Transitory	Persistent
Interaction effects			
Persistent effect	-2.025		-1.735
	(-0.74)		(-1.62)
Transitory effect			
1 year past implementation		-5.561	
		(-1.17)	
2 years past implementation		4.778	
		(1.51)	
3 years past implementation		-0.101	
		(-0.03)	
4 years past implementation		0.616	
		(0.32)	
5 years past implementation		1.705	
		(0.93)	
Bank specific controls			
RWA density (t-1)	0.259**	0.265**	0.054**
	(2.28)	(2.18)	(2.24)
Return on assets (t-1)	-2.225	-1.886	-1.162
	(-0.76)	(-0.67)	(-1.05)
LCR (t-1)	0.008	0.008	0.002
	(1.61)	(1.61)	(0.81)
NSFR (t-1)	0.041	0.034	0.012
	(0.8)	(0.69)	(1.45)
Log of leverage ratio exposure (t-1)	1.242	1.689	-4.416*
	(0.3)	(0.41)	(-1.92)
Joint test of transitory effect coefficients (transitory model specification)			
F-test		0.91	
p-value		0.48	
Statistics			
Number of observations	988	988	1004
R2	0.112	0.105	0.039

This table shows the estimation results for specifications (BCBS 1) in column 2 and specification (BCBS 2) in columns 1 and 3, respectively. The estimates draw on the 2011-2018 period based on semi-annual data. All columns include separate country-by-time fixed effects, with standard errors being clustered at the country level. T-statistics are shown in parentheses. ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively.

3. Within-country analyses

Ten jurisdictions contribute with country-specific analyses based on their proprietary micro data. They all follow a common research protocol, while using confidential supervisory datasets. The ten jurisdiction form two distinct groups. At the most granular level, six national satellite teams form the first group by using their credit register data with details on individual bank-firm relationships. The second satellite group consists of six studies conducted at the bank level[27] using bank balance sheet data[28].

The analytical setup tries to strike the balance between accommodating country specificities and pursuing a common approach. The common goal is to grant a valid comparison of outcomes across countries. The participating satellites' banking systems differ along several dimensions. To the extent possible, the analysis takes those differences into account by adding country-specific control variables in order to tailor the common approach to the unique characteristics of the individual jurisdictions. In some cases, like the EU's SME supporting factor, the research protocol explicitly addresses this region-specific feature as a control variable for the relevant subset of satellites.

Notably, for all credit register satellites, a replication of their analysis at the bank level can serve as an important cross check and builds the bridge to the satellite group of bank balance sheet analyses. The reason lies in the "extensive margin" problem which states that the entry and exit of customers cannot properly be captured, in particular when studying the growth rates of SME lending[29]. This *extensive margin* issue essentially applies to very short-term loans which are not rolled over and to SMEs that frequently enter and exit the sample in more general terms. Two out of six credit register analyses are conducted by emerging market economies for which the extensive margin issue relatively is more pronounced. For this reason, the common research protocol also suggests aggregating bank-firm level data across all borrowers to capture total outstanding loans on banks' balance sheets. These computed bank loan portfolios with information on SME lending shares create a link to the second group of satellites that have only balance sheet data at the bank-level in the first place. However, aggregating credit register data comes at a cost, as it entails losing the possibility to meticulously control for demand-side characteristics.

For the six jurisdictions with bank-firm level information a balanced panel of firms that borrow both short and long term was used where possible. When using this balanced panel, for four jurisdictions the findings suggest a temporary decline in SME lending growth that also persist on average in the observed implementation period for the most exposed banks after the RBC implementation. Long-term loans seemingly stand behind the decline in lending growth rates. In most of these jurisdictions, this effect is shared by non-SME

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[27] Two jurisdictions participated with two studies, respectively, thereby making up a total of twelve studies

[28] Not all ten jurisdictions submit results for each analysis performed in the respective group.

[29] For the credit register analyses, firm-bank relationships that last less than 3 years had to be dropped for data cleaning purposes when computing growth rates of bilateral lending. On aggregating all bank-firm relationships to the bank level these loans are included and growth rates can be computed at the bank level.

lending. It should be noted, however, that these effects only reflect changes along the *intensive margin*[30] of SME lending for a subset of firms that take out both short and long term loans.

To assess the full impact of the reforms on *total* SME lending, the bank-firm level analysis has been complemented by conducting studies at the bank level, thereby including those SMEs that frequently enter and exit bank-firm relationships, or that borrow only at very short maturities. Hence, when taking the *extensive margin* into account, the results slightly change.

Results from the studies at the bank level indicate that persistent effects on growth rates of SME lending at the most exposed banks are rare. [31] **However, half of the studies show a persistent fall in banks' portfolio share of SME loans over total corporate loans.**

3.1 Bank-firm level analysis using credit register data

Analyses based on bank-firm relationships allow to more properly separate demand from supply effects. Participating satellites merge credit register data with supervisory bank-level reports and, to the extent possible, with firm-level information. Figure 4 illustrates bank-customer relationships and the included datasets. Firms might interact with only one bank, or they might have multiple customer relationship with different banks.

The identification of reform effects rests on two pillars: first, demand effects are absorbed by a combination of firm-specific characteristics and sector-by-time fixed effects, and, second, heterogeneous bank exposures are exploited. To accommodate those single customer relationships that are more prevalent in emerging markets, the common research protocol suggests to use sector-by-time fixed effects in order to absorb time-varying demand effects. To take into account possible distorting factors that arise from distinct, time in-variant bank-customer relationships, the analysis uses bank-by-firm fixed effects. Further, some specifications control for individual borrower characteristics. What remains can plausibly be attributed to changes in bank behaviour and hence reflects affected banks' responses to regulatory changes. Second, considering that banks are differentially affected by the reforms given their heterogeneous exposures to reform measures, the analysis compares credit to the same customer extended by *more* to *less* exposed banks, before and after the reform.

Findings at the bank-firm level point to a temporary decline in SME lending growth for the most exposed banks after RBC implementation. This temporary decline is essentially driven by long term borrowing. For some jurisdictions, lending to non-SMEs seems to evolve in parallel, but the evidence is more mixed.

Some caveats remain when comparing the results.

First, different *reporting thresholds* and *definitions* exist across the different credit registers. In some jurisdictions, smaller loans with an exposure above € 25,000 are included, while in other countries, the analyses are based on loans with a total exposure above € 1 million. Furthermore, SME owners can borrow as private individuals, or as incorporated entities. The

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[30] The "*intensive margin*" of SME lending focuses on changes in the more permanent bank-customer relationships and disregards the entry and exit of borrowers.

[31] Six studies based on bank balance sheet data, and six studies based on aggregated credit register data. For one jurisdiction, data limitations only allowed to consistently estimate the SME share.

analysis focuses on incorporated entities as a dividing line. The reason is that SME owners can always inject personal savings or funds from taking out private mortgages or consumer loans, which all exceed the scope of this analysis. To the extent possible, the analysis tries to control for the differences in reporting thresholds. For instance, to render European studies comparable, the reporting threshold was raised in one particular case.

Second, firms *entering and exiting* the sample affect the bank-firm level setup (the "extensive margin" problem). Baseline results at the bank-firm level rely on changes in outstanding lending volumes and thus on the *intensive* margin of a bank-firm relationship. In order to analyse changes in the maturity structure of SME lending, baseline results focus on a balanced sample of firms that take out both short- and long-term loans. However, especially in emerging markets the extensive margin is more relevant as many firms only take out a single loans from only one bank over a short period.[32] To address this problem, the common protocol asked credit register satellites to aggregate the data and replicate the bank-level approach as described below. Differences in the results can be insightful as they tell about both the role of very short-term credit to SMEs and the entry and exit of borrowers.

Third, some jurisdictions underwent a significant economic crisis, while SMEs in others saw very favourable economic conditions. To the extent that overall economic conditions differentially affect both SMEs and their lender banks, the analysis cannot perfectly control for this. The research protocol tries to mitigate this concern by using sector-by-time fixed effects.

Fourth, a bank's exposure to the reforms is based on its ranking among competitor banks *before* the reforms had been nationally announced. On the one hand, this implies that the inference relies on a group of banks that is tracked over time – in most cases a fourth of the bank population. Depending on the number of banks operating within one jurisdiction, *idiosyncratic* effects of banks can affect the analysis. On the other hand, the group exhibiting the lowest levels of capitalisation might change over time. The current version of the analysis does not allow banks to rotate in and out of this group of the weakest banks.

Fifth, there are substantial differences across the banking systems of participating jurisdictions. These differences relate to the relative importance of banks as a source of SME funding, the average size and concentration of banks, as well as the more or less pronounced differences across different banking groups within a country.

3.1.1 Common empirical specifications for credit register analyses

Different specifications are used to shed light on the reform effects from different angles. The empirical specifications distinguish between *temporary* and *persistent* effects, and they allow reforms to have an impact on *changes in outstanding volumes,* as well as on the maturity *structure* of a banks' loan portfolio. Section 1.3 provides more details, and it illustrates the *persistent* and *temporary* effects. The corporate loan portfolio consists of lending to SMEs and to non-SMEs. The analyses are run at the bank-firm level to examine temporary (CRE 1 and CRE 3) and persistent (CRE 2) effects on growth rates.

[32] A substantial share of short-term lending that is extended for only one period (or very few periods) and that is not rolled over to another period would hence drop out of the sample when calculating loan growth rates at the individual firm level.

Temporary and persistent effects on growth rates

The analyses consider growth rates of total, short-term and long-term lending to SMEs. It then compares them to growth rates of extended loans to non-SMEs at the bank-firm level. Finally, it takes all firms into account and estimates the transitory and persistent effects on total corporate lending.

It is important to note at this stage that changes in short-term lending at the bank-firm level only capture repeated short-term lending. In principle, short-term lending refers to loans with a maturity of up to one year. As the analyses draws on data at an annual frequency, year-on-year growth rates compare outstanding levels of extended loans to a particular borrower at the end of each year. Hence, to grant a valid comparison across maturities, specifications (CRE 1) and (CRE 2) are run on a balanced sample of SMEs borrowing both short-term and long-term loans[33].

Equation (CRE 1) specifies the SME outcome variable as a growth rate in percentage changes $\left(\Delta y_{bft}\right)$ and regresses it on a set of temporary reform indicators denoted as $\sum_{k=0}^{K} Reg_{t-k}^{temp}$.

$$\Delta y_{b,f,t} = \gamma_F C\_Firm_{f,t-1} + \gamma_B C\_Bank_{b,t-1} + \sum_{k=0}^{K}\left(\beta_{RBk}^{A} RegA_{t-k}^{temp} * Bank(0/1)_{b,pre}\right) + FE(b\#f, t\#sector) + \varepsilon_{b,f,t} \quad \text{(CRE 1)}$$

Equation (CRE 2) keeps the SME outcome variable in growth rates, but it takes into account, that reforms might have a *persistent* effect on changes in lending volumes over the entire post-reform sample period.

$$\begin{aligned}\Delta y_{b,f,t} = {} & \gamma_F C\_Firm_{f,t-1} + \gamma_B C\_Bank_{b,t-1} \\ & + \left(\beta_{RB}^{A} RegA_{t}^{pers} + \beta_{RB}^{L} RegL_{t}^{pers}\right) * Bank(0/1)_{b,pre} \\ & + FE(b\#f, t\#sector) + \varepsilon_{b,f,t}\end{aligned} \quad \text{(CRE 2)}$$

To test whether the difference in lending growth to SMEs and non-SMEs is significant, specification (CRE 3) adds a triple interaction term. A time-invariant dummy indicates whether a firm is considered as an SME, SME_f. As the analysis includes bank-by-firm fixed effects, as well as sector-by-time fixed effects, some standalone and double interactions drop out. Only the interaction with the time regulatory indicators can be estimated.

$$\begin{aligned}\Delta y_{b,f,t} = {} & \gamma_F C\_Firm_{f,t-1} + \gamma_B C\_Bank_{b,t-1} \\ & + \sum_{k=0}^{K}\left(\beta_{RBk}^{A} RegA_{t-k}^{temp} * Bank(0/1)_{b,pre}\right) + \sum_{k=0}^{K}\left(\beta_{RFk}^{A} RegA_{t-k}^{temp} * SME_f\right) \\ & + \sum_{k=0}^{K}\left(\beta_{RFk}^{A} RegA_{t-k}^{temp} * SME_f * Bank(0/1)_{b,pre}\right) + FE(b\#f, t\#sector) + \varepsilon_{b,f,t}\end{aligned} \quad \text{(CRE 3)}$$

[33] In one case, information on the maturity of loans was not available. All loans were considered in this case.

All specifications refer to the description of variables below, with standard errors being either clustered at the bank or firm level depending on the jurisdiction which is running the analysis.

3.1.2 Comparing the different satellite's results: credit register analyses

For four out of six jurisdictions with bank-firm level data, the findings suggest a decline of SME lending growth for the most exposed banks after RBC implementation. The first part deals with the temporary effect on growth rates of outstanding SME loans, before turning to persistent effects on growth rates and the share of SME loans in total level.

Temporary and persistent effects on growth rates

Results suggest a temporary decline of SME loan issuance by the ex-ante most exposed banks after RBC implementation in four of the six different credit register analyses. In most jurisdictions, SME credit growth falls in the immediate post-reform period (Figure 11, top left-hand panel).

The range of this decline varies considerably, but the negative effects are significant in most cases. In the subsequent period (t+1), results suggest another significant drop in SME lending growth rates relative to the previous period, although the spread across countries narrows. The total (cumulative) decline relative to the pre-implementation period captures the sum of the sequence of individual period declines. Hence, this second drop adds to the previous one which means that in cumulative terms, the growth rate declines even more, although at slowing pace.

Results in the second period after the implementation reveal another drop for most jurisdictions. However, the spread widens again and might start picking up further RBC implementation stages or other reforms. In some cases (especially in the euro area), this period coincides with the legal framework implementation (Figure 3). In subsequent periods, the findings are less conclusive and probably mingles delayed RBC effects with other reforms like the leverage ratio[34].

When separating long-term from short-term lending by the most affected banks, divergent findings emerge. To recall, in order to distinguish between different maturities and draw inference on the same type of borrowers, the analysis is restricted to those SMEs that take out long- and short- term (actually rolled over) loans during the sample period. The benefit from this procedure is that the analysis draws on more balanced sample of SME borrowers. As a side effect, borrowers are more similar in terms of their characteristics, which means that the sample most likely features the larger and more creditworthy SMEs.

Long-term loans seemingly stand behind the overall temporary SME decline. The evolution of long-term credit extension (Figure 11, bottom, left-hand panel) broadly replicates the patterns of total SME lending growth and can hence be identified as the driving force. Estimates on the transitory effects for long-term SME lending reveal to be more significant and bigger in absolute size.

By contrast, estimates on the short-term transitory effects are less conclusive (Figure 11, bottom right-hand panel). One reason for this might be that short-term lending is more volatile in general. Another reason might be that the analysis focuses on a subset of borrowers that keep renewing their short-term loans. In particular, growth rates are based on changes in the

[34] It is important to note that the G-SIB/D-SIB framework also overlaps with the RBC reform for some jurisdictions in 2012.

outstanding level of loans at the bank-firm level with credit register data being collected at the annual level. To track growth rates for the same borrower, very short-term loans that are not renewed essentially drop from the sample, and so does a borrower which only takes out that kind of loan.

Results on the persistent effect on growth rates over the post Basel III period show a reduction in the pace of SME lending growth especially for long term loans that mirrors the sequence of initial transitory declines (Figure 12). It thereby captures the initial drops, but also later periods towards the end of the sample (in most cases 2017). Lagged RBC effect might to some extent mingle with other reforms that only enter into force later. For this reason, the persistent estimates on the post-RBC decline in growth rates may capture also the later impact of the entire sequence of Basel III reforms, in particular those targeting capital.

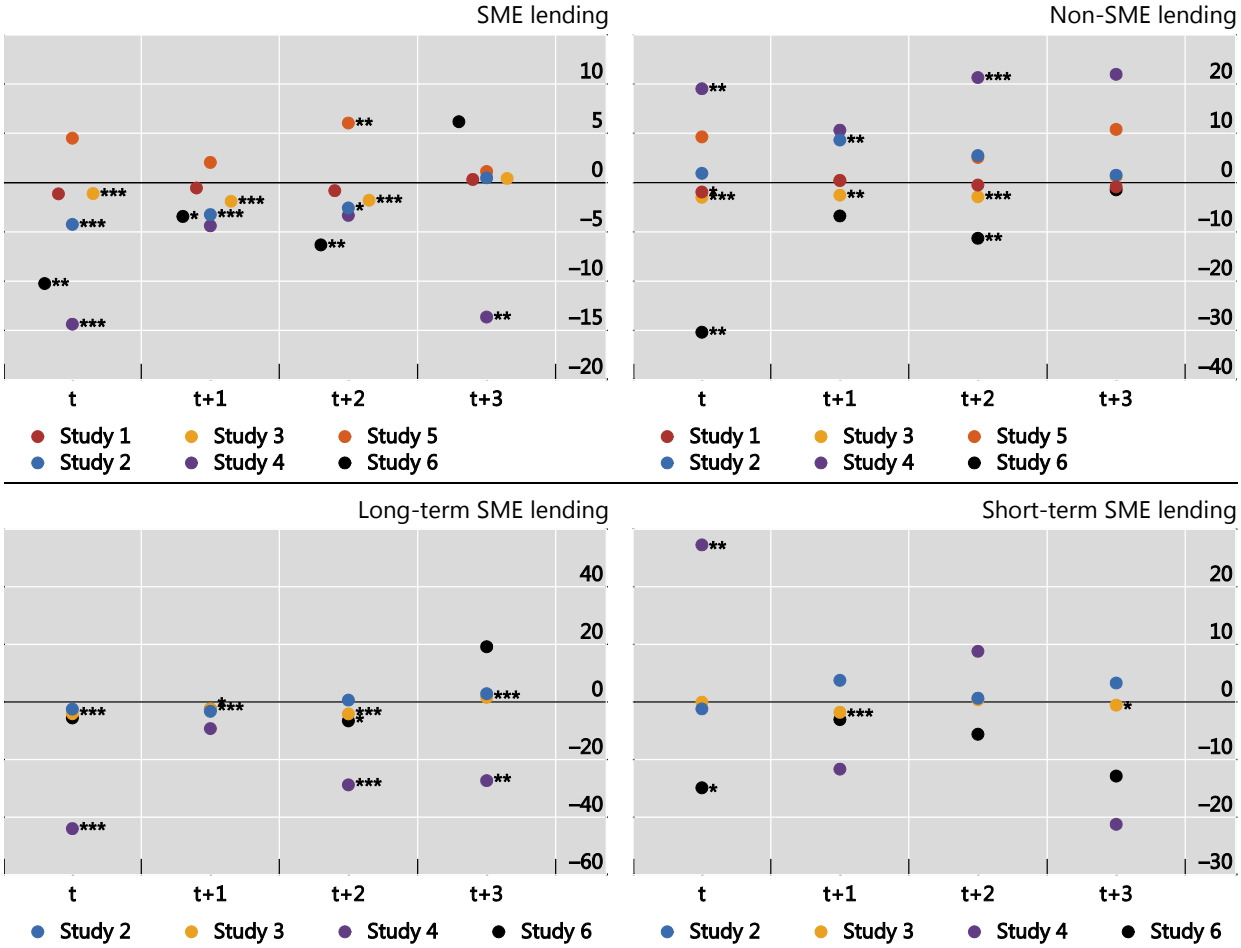
Evidence on lending to non-SMEs seems is more mixed. For some jurisdictions, credit to non-SMEs seems to evolve in parallel. Half of the studies exhibit a contemporaneous decline in the reform implementation period which remains significant over the following two periods for two out of six jurisdictions (Figure 11, top right hand panel). This diverse picture is confirmed by the *persistent* effect (Figure 12, right-hand panel). As non-SMEs might substitute bank loans by other funding sources, declining demand might actually contribute to this finding.

Results on the triple interaction seemingly replicate this pattern. Results from only one jurisdiction suggest that SME credit growth for the most exposed banks after the RBC implementation declines relatively more than credit growth to non-SMEs (Figure 12, left-hand panel).

RBC: Transitory effects based on credit register data at the bank-firm level

Percentage points

Figure 11



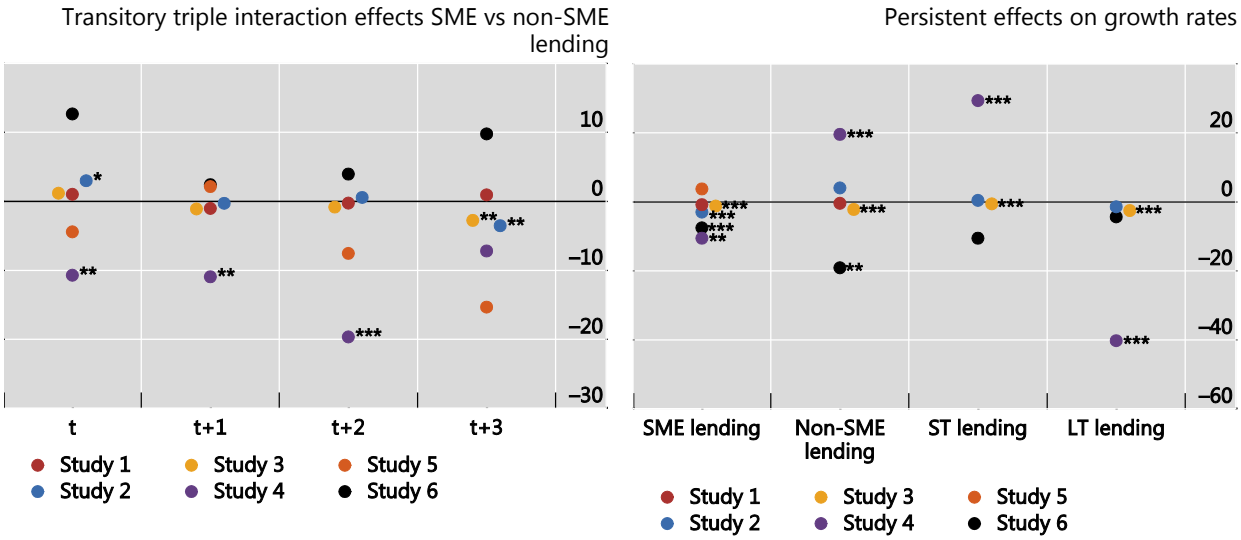
This table shows the estimation results for specification (CRE 1) with each dot representing one particular satellite study. The underlying data used by jurisdictions with credit register data is based on balanced sample of firms that take out both short- and long-term loans over the estimation period. Corporate lending captures the sum of SME and Non-SME lending. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.

Sources: National credit registers and central banks.

RBC: effects based on credit register data at the bank-firm level

Percentage points

Figure 12



This table shows the estimation results for specifications (CRE 2) in the right-hand panel, and (CRE 3) in the left-hand panel. Each dot represents one particular satellite study. The underlying data used by jurisdictions with credit register data is based on balanced sample of firms that take out both short- and long-term loans over the estimation period. Corporate lending captures the sum of SME and Non-SME lending. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.

Sources: National credit registers and central banks.

3.2 Bank-level portfolio analyses

The bank-level analyses consider changes in the loan portfolio of banks and thereby they provide an important complement to other pieces of the evaluation. In particular, bank level analyses cover all types of loans extended to all borrowers, even for very short term maturities. Ten jurisdictions with twelve studies in total participate in this bank level analysis (six studies with bank balance sheet data and six with aggregated credit registry data). In terms of coverage, this comparison yields the broadest range of results based on supervisory micro-level data.

The reform identification again rests on two pillars, now at the bank level. First, to absorb demand effects, macroeconomic control variables or time fixed effects[35] enter the specifications. Second, heterogeneous reform exposures imply that banks are differentially affected. It is this differential impact that helps to identify the effects on banks' SME lending business.

These bank-level analyses share several caveats from the credit register analyses, such as differences in the structure of the national banking systems, divergent macroeconomic developments, as well as the restricted view on an isolated sample of ex-ante exposed banks.

Nonetheless, the extensive margin problem is solved at this stage, and the reform effects on the total SME portfolio including very short term loans and all borrowers can be assessed.

[35] In some cases location-by-time fixed effects have been used with the location referring to the banks' headquarters.

3.2.1 Common empirical specifications

Empirical specifications at the bank-level mirror those of the credit register analysis. They separately consider *temporary* and *persistent* effects, and they distinguish between reform effects on changes in outstanding volumes and on the composition banks portfolio.

Equation (BNK 1) shows the SME loan outcome variable as a growth rate in percentage changes $\left(\Delta y_{bt}\right)$ and analyses the impact of a set of *temporary* reform indicators described as $\sum_{k=0}^{K} \mathrm{Reg}_{t-k}^{temp}$. More details on the temporary versus persistent impact and their illustration are provided in Section 1.3.

$$\Delta y_{b,t} = \gamma_B C\_Bank_{b,t-1} + \sum_{k=0}^{K}\left(\beta_{RBk}^{A} RegA_{t-k}^{temp} * Bank(0/1)_{b,pre}\right) + FE(b,t) + \varepsilon_{b,t} \qquad \text{(BNK 1)}$$

Specification (BNK 2) captures growth rates of SME lending again, but it allows reform effects to have a persistent effect.

$$\Delta y_{b,t} = \alpha + \gamma_B C\_Bank_{b,t-1} + \left(\beta_{RB}^{A} RegA_{t}^{pers} + \beta_{RB}^{L} RegL_{t}^{pers}\right) * Bank(0/1)_{b,pre} + FE(b,t) + \varepsilon_{b,t} \qquad \text{(BNK 2)}$$

Equation (BNK 3) turns to portfolio shares like the share of long term SME loans in the total SME loan portfolio, or the share of SME relative to total corporate loans to the non-financial sector. Shares are regressed on a persistent reform indicator.

$$y_{b,t} = \gamma_B C\_Bank_{b,t-1} + \left(\beta_{RB}^{A} RegA_{t}^{pers} + \beta_{RB}^{L} RegL_{t}^{pers}\right) * Bank(0/1)_{b,pre} + FE(b,t) + \varepsilon_{b,t} \qquad \text{(BNK 3)}$$

The following list describes the bank-level variables. Standard errors are either robust or clustered at the bank level, if enough clusters exist.

Δy_{bt}	Total SME or total non-SME lending by bank *b,* (log change in %)
y_{bt}	Total SME/total corporate lending (%)
$Bank(0/1)_{b,pre}$	Indicator, based on banks average exposure measure is ≤ **p25, or p50**

$C\_Bank_{b,t-1}$	Lagged bank control variables (e.g. log total assets, loan-to-asset, deposit-to-asset, NPL ratio, RBC and LCR ratio, ROE, operating income etc.)
$FE(b,t)$	Separate bank and time fixed effects, in some cases region-by-time FE at the sub-national level according to bank's headquarters

3.2.2 Comparing the different results based on bank level evidence

When looking at the bank-level analysis, the evidence on a *temporary* decline in the growth rate of SME lending is limited to a small subset of studies (three studies, Figure 13, left-hand panels**).** In the two periods after reform implementation, the decline remains significant in only one jurisdiction. It is interesting to note that when aggregating granular bank-firm level data to the bank portfolio level, the *temporary* decline in SME lending growth rates disappears for some credit registers studies. Results can deviate from the bank-firm level analyses, as the aggregated sample now captures all bank-firm relationships including entry and exit of very short-term loans that otherwise drop out when constructing growth rates.[36] However, the aggregated sample allows for a less clean identification in comparison to the previous section, since data at the bank-firm level was better suited to control for demand effects.

Persistent effects on the growth rates of SME lending are rare, essentially confirming previous conclusions. Results from only two jurisdictions suggest that the most exposed banks *persistently* cut their SME lending growth in the post reform period (Figure 14, left-hand panels). These two jurisdictions also counted among those that reported a significant temporary decline**.** Country-specific circumstances might explain these lasting drop which cannot fully be controlled for.

Lending to non-SMEs by ex-ante most exposed banks reveals hardly any significant evidence at the bank level. When turning to *non-SME lending*, the empirical evidence across the studies is mixed. An immediate drop in the lending growth rate emerges only for one jurisdiction, while one other jurisdiction reports a significant increase. For the remaining analyses, the effects are not significant (Figure 13, right-hand panels). This is confirmed in the analysis of persistent effects. Loan extension to non-SMEs by the most exposed banks slows significantly in two studies. Out of these two, only one jurisdiction reports significant *persistent* declines in lending growth to both, SMEs and non-SME.

Although persistent effects on growth rates are rare, in half of the studies there seem to be a *persistent* fall in the *share SME relative to total corporate lending.* For three jurisdictions with credit registry data, the portfolio share of SME lending fell significantly. These declines range between 1.7 and 5.4 percentage points over the post-RBC period (Figure 14, bottom right-hand panel). For studies with bank balance sheet data, the share of SME in total corporate lending by the most exposed banks fell by about two percentage points in two jurisdictions, while one jurisdiction experienced a drop in the share of SME lending by 7.5 percentage points (Figure 14, bottom right-hand panel). For both groups, drops in the SME portfolio share reflect

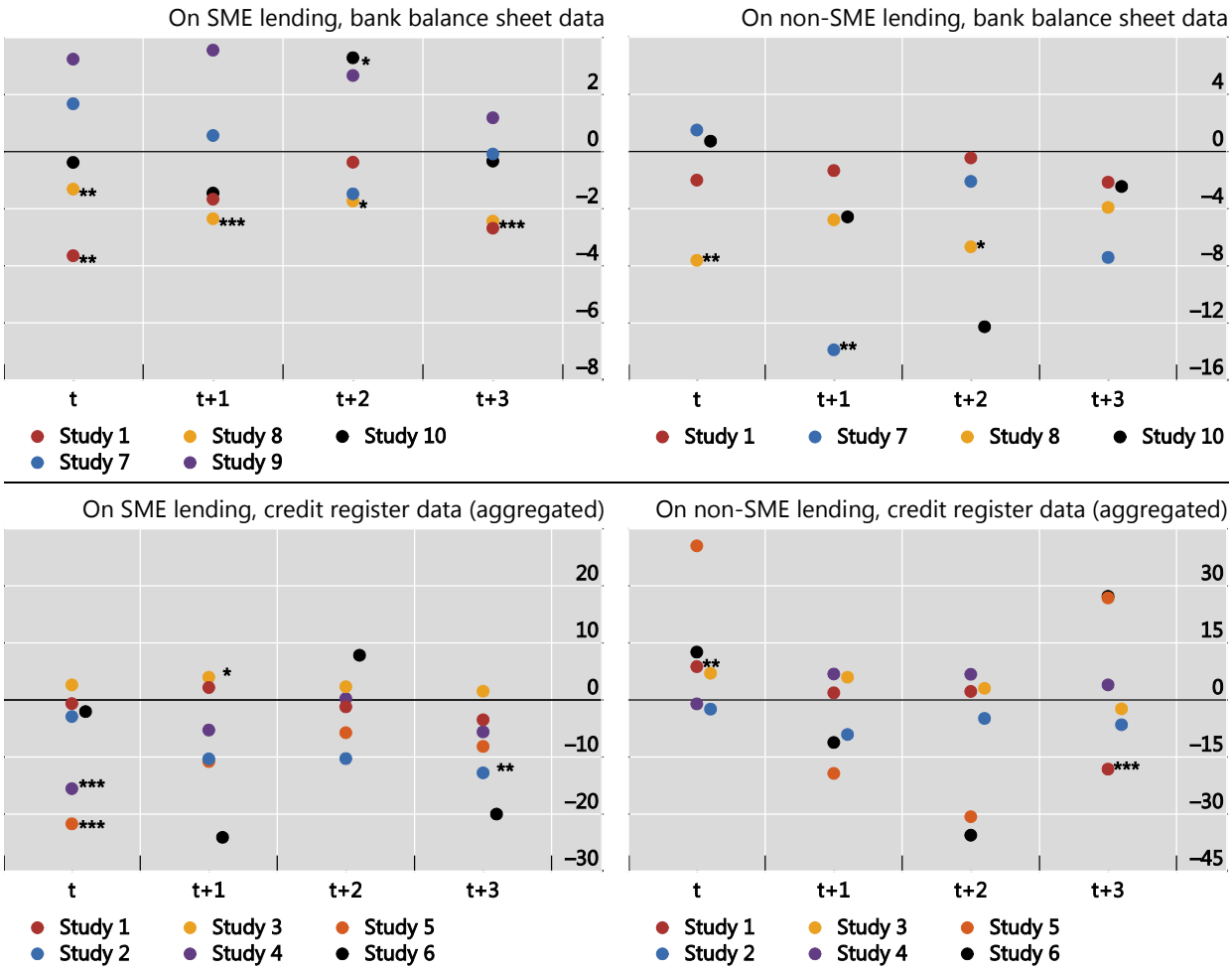
[36] The different result might suggest that there is a role played by short-term, one period loans that are not captured when looking at growth rates at the individual bank-firm level and are captured when looking at the bank portfolio. Differences in the reporting threshold may also further add to differences in the results

a net outcome that may result from different forces. In some cases, they might ensue from higher lending growth rates to non-SMEs borrowers rather than to a marked reduction in lending to SMEs.

RBC: Transitory effects at the bank level

Percentage points

Figure 13



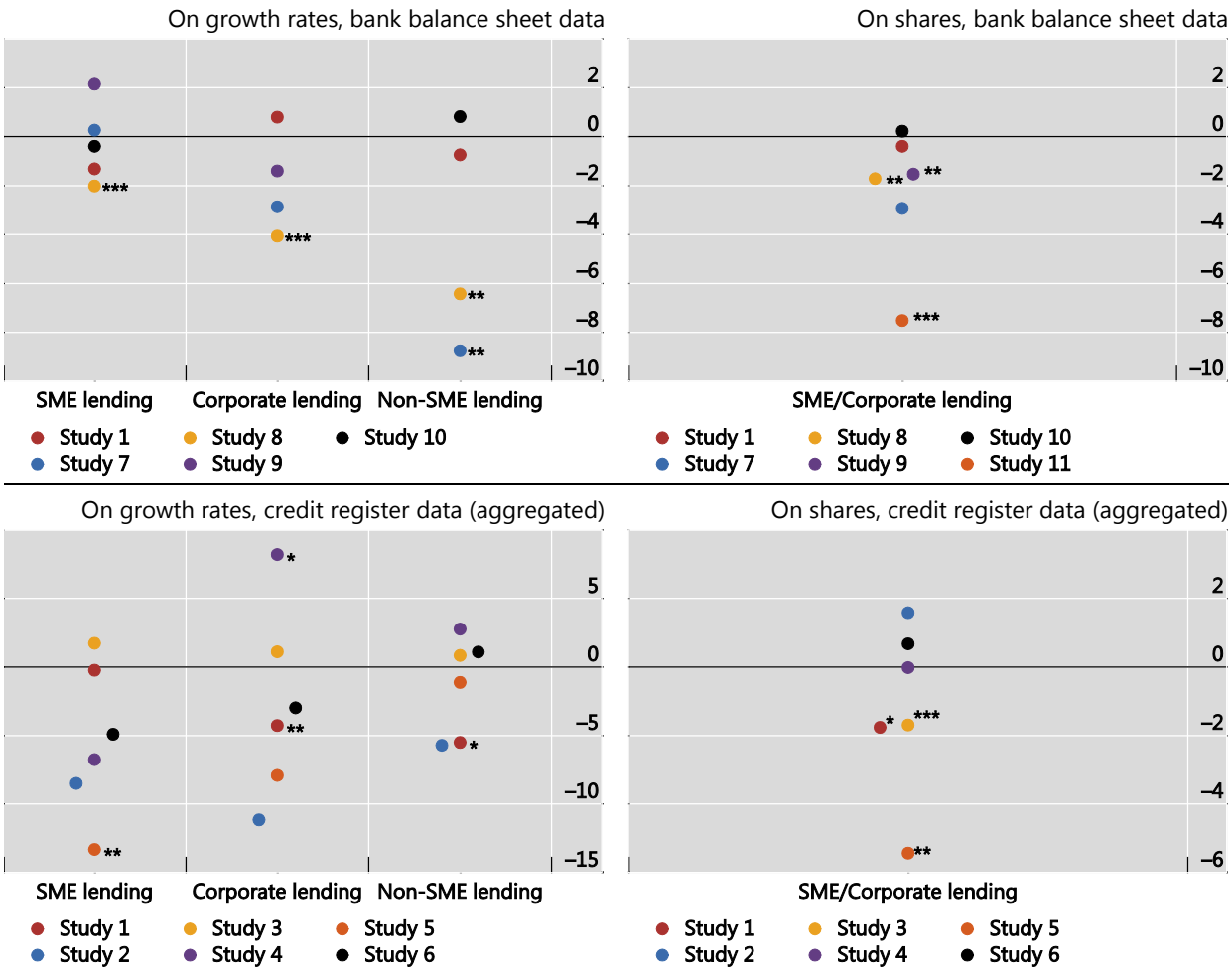
This table shows the estimation results for specification (BNK 1) Each dot represents one particular satellite study. Corporate lending captures the sum of SME and Non-SME lending. For one jurisdiction, data limitations only allowed to consistently estimate the SME share. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.

Sources: National credit registers and central banks.

RBC: Persistent effects at the bank level

Percentage points

Figure 14



This table shows the estimation results for specifications (BNK 2) in the left-hand panels, and (BNK 3) in the right-hand panels, respectively. Each dot represents one particular satellite study. For one jurisdiction, data limitations only allowed to consistently estimate the SME share. Corporate lending captures the sum of SME and Non-SME lending. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.

Sources: National credit registers and central banks.