"Support is appreciated": On the effectiveness of the SME Supporting Factor*

Sergio Mayordomo   María Rodríguez-Moreno**

Banco de España   Banco de España

Abstract

The introduction of the SME Supporting Factor (SF) allows banks to reduce capital requirements for credit risk on exposures to firms with a turnover of below EUR 50 million. This means that banks can free up capital resources that can be redeployed in the form of new loans. Our study documents that the SF alleviates credit rationing for medium-sized firms that are eligible for the application of the SF but not for micro/small firms. These results suggest that European banks were aware of this policy measure and optimized both their regulatory capital and their credit exposures by granting loans to the safest SMEs. Several extensions are used to isolate the effects of the SF on SME lending and to make them clearly visible.

First Draft: November 2016

This Draft: January 2017

1. Introduction

Article 501(1) of CRR introduces the small and medium enterprises (SME) Supporting Factor (SF) according to which "capital requirements for credit risk on exposures to SMEs shall be multiplied by the factor 0.7619". The SME exposures that qualify for this capital requirement deduction are those with a turnover of below 50 million of Euros. As stated in the European Banking Authority (EBA) (2016) report, the purpose of this deduction is "to allow credit institutions to increase lending to SMEs following the crisis, and to alleviate regulatory changes that were expected to have a disproportionate impact on SME lending. One justification for the introduction of the SF is to counterbalance the negative impact of the CCB introduced as part of the measures following the crisis." Following the implementation of the CCB, banks had to hold a minimum capital requirement of 8% plus an additional CCB of 2.5% of their risk weighted exposures. The implementation of the SME SF, which is equal to the ratio 8 over 10.5, required that banks held a total of 8% of their risk weighted exposures to SME, cancelling out the impact of the CCB.

The introduction of the SME SF brought about a mechanical increase in the capital ratios as a result of applying the deduction on the SME exposures already held by the institutions and the new loans granted to SMEs. This means that banks freed up capital resources that could be redeployed in the form of new loans. According the EBA (2016) estimations, the capital relief resulting from the implementation of the SME SF led to an increase of 0.16 percentage points of an average Core Equity Tier 1 ratio of 13.1% and a decrease of the minimum capital requirements of EUR 11.7 billion as of the third quarter of 2015. However, the SF is a temporary measure rather than a permanent mechanism to alleviate the effects of lending to SMEs during the crisis and it is intended to be gradually withdrawn as the economy recovers. For this reason, it seems necessary to gain a thorough understanding of its effects on the credit flows to SMEs.

Our paper aims to contribute to the discussion on the need and effectiveness of the SF on SME lending by answering the following questions. Does the SF reduce the credit constraints suffered by the SME to obtain funding? Is the SF more effective for specific types of SME? Our analysis based on the Survey on the Access to Finance of Enterprises (SAFE) documents an ease in credit constraints faced by medium-sized firms before the introduction of the SF. As a complementary experiment, we conduct an analysis based on Spanish bank-firm matched micro-data in which the treatment group consists of firms that, according to their exposure to each specific bank, are effectively eligible for the application of the SF. By means of this experiment, we document that credit flowed more to those medium-sized firms whose loans were able to benefit from the SF, thus supporting its effectiveness.

There is extensive literature studying the effect of capital requirements on bank lending. Although higher capital requirements enhance financial stability and make bank lending more stable over time, they could also damage credit supply leading to a significant credit contraction. Indeed, an increase in capital requirements is most likely to lead to credit supply contraction (Francis and Osborne, 2009; Cosimano and Hakura, 2011; Hyun and Rhee, 2011; Aiyar, Calomiris, and Wieladek, 2014; Aiyar et al, 2014; Bridges et al., 2014; Schoenmaker and Peek, 2014; Fraisse, Lé, and Thesmar, 2015; Mésonnier and Monks, 2015; De Jonghe et al, 2016; among others). This effect is found to be sizeable in some studies such as Fraisse, Lé, and Thesmar (2015). They use loans extended by French banks to French firms over the 2008-2011 period and report that an increase of one percentage point in capital requirements reduces lending by 10%. This effect is especially harmful during the recent crisis and particularly so for small firms, which are highly dependent on bank lending, and even more problematic if the banks have low capital ratios and have recorded losses on financial assets (Popov and Udell, 2012). The scenario we are analyzing is the one in which the SF offers a capital requirement deduction from the existing and new loans to SMEs. In this context, we document that banks

increased lending to a specific segment of SMEs that led to lower capital requirements: medium-sized firms.

Besides the role of capital requirements on lending, there is another line of research that examines the impact of capital requirements on bank risk-taking. One stream of this literature supports the idea that under certain circumstances capital requirement is effective in controlling risk-taking incentives (Furlong and Keeley, 1989; Rochet, 1992; Repullo, 2004). More concretely, Berger and Udell (1994) and Albertazzi and Marchetti (2010) note that when banks face higher capital requirements they cut lending to the riskier borrowers. De Haan and Klomp (2012) find that capital regulation reduces 'capital and asset risk' of banks and Barth et al. (2004) document that banks facing more stringent capital regulations have fewer nonperforming loans. However, another stream of the literature states that more stringent capital regulation may lead to higher bank risk-taking (Blum, 1999) although this could depend on the initial capital position of banks and the stringency of the capital rules (Calem and Rob, 1999). We add to this literature, examining a regulatory change that alleviates banks capital ratios and show evidence which suggests that lower capital requirements do not necessarily lead to higher risk taking. In fact, we reveal that less stringent capital requirements led to lower risk taking given that credit flowed to medium-sized firms, which are known to be less risky than micro-small firms (see EBA, 2016). Moreover, credit flowed more to medium-sized firms than to other larger firms whose loans were able to benefit from the SF but which were less productive than medium-sized firms.

In 2014, there were 22.3 million active SMEs in the non-financial business sector of the European Union (EU). These firms employed almost 90 million people and generated more than EUR 3.7 trillion in added value. SMEs can only access capital through banks and so they are highly vulnerable to banking crises compared to firms with alternative sources of capital (Chava and Purnanandam, 2011). This evidence emphasizes the role of SME finance in real economic activity and the negative effect that credit rationing

could have on it. Thus, Duygan-Bump, Levkov, and Montoriol-Garriga (2015) find that small businesses were laying off workers in the 2007-2009 recession in the United States due to credit constraints. Given the importance of SMEs in the real economy our analysis suggests that the decision to eliminate the SF should be carefully reviewed given that its positive effects on SMEs access to funding could vanish, ultimately affecting employment and investment.

The existing evidence on the effectiveness of the SF is rather mixed. EBA (2016) conducted an exercise to evaluate the effectiveness of the SF and failed to "identify any increase in access to finance for SMEs relative to large firms following the introduction of the SME SF". As a response to the EBA discussion paper, the European Banking Federation performed a descriptive analysis according to which it is not obvious that the effect of the Supporting Factor is so negligible. In this context, our paper studies in detail all the factors associated with the implementation of the SF to conduct further and new analyses which provide fresh evidence which make its positive effects on SME lending clearly visible. We document that this effect is not consistently positive across the different groups of SMEs due to its heterogeneity. Specifically, the SF contributes strongly to alleviating credit rationing faced by medium-sized firms but not by micro/small firms; consistent with the idea that banks optimize their regulatory capital by granting loans to those SME that require less capital (i.e., with lower RWA) and which, moreover, present less risk. Our results are also consistent with those presented in the Bank of Spain Financial Stability Report 05/2014, obtained from data from Spanish banks and firms.

From a different angle, Dietsch et al. (2016) find that the SF may be justified for SMEs in the Advanced Internal Rating Based (IRBA) corporate exposure class, given that the current IRBA calibration is conservative compared to the riskiness of these exposures. The authors find that it is also justified under the Standardized Approach (SA) for both corporate and retail exposure classes. Our results, complemented with the ones obtained by

Dietsch et al. (2016), provide detailed evidence supporting the correct functioning of the SF and give support for its implementation and maintenance. However, it is essential to monitor its effectiveness to understand how it is currently functioning. Some potential variations could be considered based on the firms to which it applies or on the threshold with regard to the limit of the amount owed for its application. In addition, further measures are needed to guarantee the extension of lending to all types of SMEs (i.e., not only medium-sized firms).

The remainder of this paper is organized as follows. Section 2 describes the data and the main variables employed in our analysis. Section 3 presents the methodology and the baseline results on the impact of the SF on the SME lending. Section 4 provides additional evidence on the role of the SF. Section 5 contains the results for an experiment based on Spanish bank-firm level data. Section 6 concludes.

2. Data

2.1.   Sample selection

Our primary dataset is the Survey on the Access to Finance of Enterprises (SAFE) conducted by the European Commission and the European Central Bank (ECB).[1] This survey has been available since 2009 on a semiannual basis. Each wave collects information on the funding needs and financing constraints that companies faced in the six months under study. Since 2013, every year one wave is conducted by the European Commission at EU level (28 countries) while the other wave is conducted by the ECB for 11 Euro Area (EA) countries.[2,3]

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[1] Examples of recent papers using SAFE to study firm's access to finance include: Casey and O'Toole, (2014) Ferrando et al. (2016a, 2016b), among others.
[2] Before 2013, the European Commission carried out the first and the fifth waves (years 2009 and 2011). The remaining six waves (i.e., waves 2 – 4 and 6 – 8) were conducted by the ECB.
[3] The 11 EA countries are: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, The Netherlands, Portugal and Spain.

Given that the SME SF was implemented in early 2014 in all EU countries apart from Spain (September 2013), we use three different samples for the analysis. The first one represents the baseline sample and consists of EU countries among which Spain is not included (EU-27). This sample consists of two waves: the ninth wave that covers the pre-SF period (April – September 2013) and the eleventh wave that covers the post-SF period (April – September 2014). We exclude Spain from this sample because the SME SF was implemented four months earlier than the other EU countries and the eighth and tenth waves (i.e., the waves that strictly define the pre- and post-SF period for Spain) are only available for the EA countries. We exclude the tenth wave because it covers both pre- and post-SF periods.

The second and third samples are used to conduct several robustness analyses and extensions. The second sample consists of EA countries among which Spain is not included for comparability reasons (EA-10). In this sample, we use the ninth and the eleventh waves for the pre- and post-SF period, respectively. The third sample is used for an extended analysis of the EA countries that allows us to include Spain (EA-11). In this sample we use the eighth and ninth waves for the pre-SF period (October 2012 – September 2013) and the eleventh and twelfth waves for the post-SF period (April 2014 – March 2015). Given that the SF was applied in Spain earlier than in the rest of Europe, we exclude the ninth wave for Spain.

Besides the effectiveness of the SF, credit supply and credit conditions could also be affected by the coetaneous non-standard monetary policies adopted by the ECB. Thus, in June 2014, the ECB announced the introduction of the Targeted Longer-Term Refinancing Operations (TLTROs) whose primary objective was to improve bank lending to the euro area's non-financial private sector. This program was designed in a series of eight operations conducted at quarterly intervals starting at the end of September 2014, just at the very end of the eleventh wave. Moreover, in the case that the TLTROs exhibit a positive effect on bank lending, they should similarly affect SMEs and large firms.

In addition, in August 2012, the ECB announced that it would undertake OMTs in secondary, sovereign bond markets, aimed "at safeguarding an appropriate monetary policy transmission and the singleness of the monetary policy". In fact, Ferrando et al. (2016a) find that this program had an immediate positive impact on access to finance during the first six months after the announcement of the ECB's OMT program in countries that were affected more severely by the crisis.

Finally, in 2013, the EU adopted a legislative package to strengthen the regulation of the banking sector and to implement the Basel III agreement in the EU legal framework. This package applies as of 1 January 2014. The main changes with this package are the dramatic changes in the level of capital requirements and the quality of capital. Changes related to the quality of capital were implemented in 2014 (i.e., in conjunction with the SME SF) while most of the new provisions related to the level of capital are phased-in between 2016 and 2019. The effect of changes in the quality of capital could impact on the banks' cost of capital which is directly transferred in the form of higher interest rates. Thus, this policy should impact on credit demand but should not affect the banks willingness to lend to SMEs.

The implementation of these additional measures and programs that may have an impact on lending could blur the effects associated with the SF and make it difficult to disentangle the specific supply side shifts through econometric modelling. For that reason, and to avoid the results from being clouded by the role of those measures, we restrict the baseline sample and the corresponding analyses to the SAFE waves around the Supporting Factor (i.e., waves nine and eleven). By restricting the sample period to include just the waves immediately before and after the SF, we can be confident that the effect identified is that inherent to the SF.

2.2.   Classification of firms according to their size

We classify a given firm as an SME based on the European Commission Recommendation 2003/361/EC of 6 May 2003 according to which the category of SMEs is made up of enterprises which employ fewer than 250 persons and have an annual turnover that does not exceed EUR 50 million. The rest of the firms are considered as large firms according to this criterion. However, in the application of the SF large firms could benefit from the SF whenever their turnover does not exceed EUR 50 million. We exclude those firms from the baseline analysis in order to isolate the impact of the SF on SMEs. Otherwise, the treatment group would not be formed exclusively by SMEs or the control group would be contaminated by large firms that could be potential benefactors of the SF but that exhibit a low turnover. In addition, we exclude from the sample all listed firms because they have access to alternative sources of funding and those firms for which we do not have information either about the turnover or the number of employees and so, cannot be classified according to the size criterion. We deal with those large firms with access to the SME SF in Section 4.2 and with listed firms in Section 4.3 to provide further evidence and robustness on the effect of the SME SF.

2.3.   Variables and descriptive statistics

Table 1 reports the descriptive statistics for the three resultant samples depending on the coverage of countries detailed before. The statistics are obtained using weights designed to restore the proportions of the economic weight of each size class, economic activity, and country.[4] The descriptive statistics are fully consistent across the three samples. Thus, we observe that around 70% of the firms in the three alternative samples can be classified as SMEs according to the European Commission Recommendation. The SME category is further split into two categories micro/small and medium-sized firms. The former category is composed of those enterprises which employ fewer than 50 persons and whose annual

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[4] These weights are provided by SAFE.

turnover does not exceed EUR 10 million whereas the medium-sized category consists of the rest of the SMEs. Around 20% of the firms in the three alternative samples can be classified as medium-sized firms while around 50% of the firms are micro/ small firms.

[Insert Table 1 here]

The baseline analysis focuses on those firms that apply for a loan or for a credit line (or both). Thus, we exclude those firms that do not apply for a loan or credit line, reject them because they are too costly, or those for which the resolution is still pending or missing. This is to guarantee that our analysis evaluates the effects of the SF implementation exclusively from the supply side rather on self-rationing. The dependent variable in our analysis (*D. Credit Constrained*) is a dummy that equals one when the firm is constrained and zero otherwise. A firm is considered as constrained whenever it receives less than 75% of the requested amount (including total rejection) in any of the contracts. Hence, the unconstrained firms are those companies that apply for a loan or a credit line and received more than 75% of the amount requested. As can be observed in Table 1 for the three alternative samples, around 19% of the firms are constrained in the three alternative samples.

Our benchmark constraint is the same used in Casey and O'Toole (2014). Thus, the firms whose loan application was accepted by the bank but refused it because it was too costly are excluded from the sample because their decision depends on the loan conditions (i.e., the banks offer a loan at high interest rate or a rate that is higher than expected). In agreement with Casey and O'Toole (2014) if a given firm turns down a loan, claiming that the interest rate offered was too high, it may indicate that they do not have positive net present value investment projects that can be undertaken profitably at the current market cost of capital. So, this constraint captures firm's credit constrained through price-based rationing by banks, but not quantity. Indeed, only 3% of the companies refused the loan/credit line because it was too costly. The firms that do not apply for a loan/credit

because of possible rejection are excluded because this decision depends on demand conditions and it is not necessarily related to the supply itself, which makes it difficult to conclude that the SME SF had any effect on the bank decision to grant a loan. Moreover, it is very difficult to claim that the SMEs were aware of the existence of the SF, and the potential advantages that it could have on their access to credit and their credit supply.

We use a set of dummy variables to capture different firm characteristics. Concretely, we use three dummy variables corresponding to four intervals referring to the firm age: less than 2 years, between 2 and 5 years, between 5 and 10 years, and more than 10 years. Besides the firm age, this variable can be understood as a proxy for relationship lending since the older firms are more probable to have had previous interactions with the bank. We use two dummy variables that define the nature of the firm: individual or family firm and autonomous. The first one distinguishes between individual or family firms and other type of firms. The second variable distinguishes between autonomous profit-oriented enterprises and subsidiary firms. According to Table 1 and as expected, given the dominance of SMEs, most of firms in the sample are individual or family firms (83%) and autonomous profit-oriented enterprises (90%). To control for the firm credit quality we use a series of dummy variables that take value one in the case that the firm capital or the firm economic outlook have improved, and zero otherwise. In addition, we use two dummy variables that are equal to one in the case that the firm credit history (interest expenses) deteriorates (decreases) and zero otherwise.[5] We observe from the three alternative samples that around 30% (19%) of firms improved their capital (firm economic outlook) while around 24% of firms benefited from lower interest expenses. In addition, only 16% of firms suffered from the deterioration of their credit history.

We also include a set of country specific variables that enables us to control for the country economic activity and the main characteristics of the

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[5] The interest expense is defined as the difference between the interests that the firm pays for its debts minus the interest the firm receives for its assets.

banking sector. Concretely, the economic activity is proxied by the GDP growth and the leverage of the private sector measured through the private debt to GDP ratio. The banking sector is characterized in terms of its efficiency through the cost-to-income ratio and its riskiness measured from the problem loans to gross customer loans. We observe sizeable differences across countries. For example, the leverage ratio ranges from 52% (Lithuania) to 328% (Luxembourg), the non-performing loans ratio ranges from 1% (Sweden) to 36% (Bulgaria) whereas the efficiency ratio ranges from the 38% (Malta) to 94% (Slovenia).

The SAFE survey also provides information relative to the sector in which the firms operate. Firms are classified in four sectors: industry, construction, trade and services. According to the published results of the survey for the ninth and eleventh waves, around the 34% of firms belong to the sector services; industry and trade sectors cover around 27% of firms each; while 11% of firms belong to the construction sector. However, in the application of the statistical disclosure controls, microdata is anonymized for large firms. Thus, while we observe the sector of individual SMEs, this information is not available for large firms. For that reason, we do not use the sector in the baseline analysis as an additional control variable in the form of fixed effects; given that besides the sectorial effect it could reflect a size effect that is the one we aim to capture in our analysis with the variables defined for such purpose.[6]

3. Methodology and Results

3.1.   The effect of the Supporting Factor on SMEs access to credit

We first study the impact of the SF on SME lending based on an analysis in which the treatment group consists of SMEs whereas the control group consists of large firms that are not affected by the SF. Thus, we evaluate

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[6] The sector will be employed in a later analysis based on the specific matching estimation technique to confirm the robustness of our results to its use.

how the application of the SF leads to a change in lending to SMEs relative to large firms, to which the capital discount is not applicable. The dependent variable *D. Credit Constrained* is regressed on a dummy variable that takes value one for SMEs and zero otherwise (*SME*), a dummy that is equal to one after the implementation of the *SF* and zero before that event, the interaction of these two dummy variables, and a series of firm characteristics, country characteristics, and country (*j*) fixed effects:

$$D. Credit\ Constrained_{ijt}$$
$$= \alpha + \beta_1 SME_i + \beta_2 SME_i \times SF_t + \beta_3 SF_t + \Gamma Firm\ Characts_{it} \quad (1)$$
$$+ \Upsilon Country\ Characts_{jt} + \Phi_j + \epsilon_{ijt}$$

where the coefficient β_2 can be interpreted as a difference-in-differences estimator. The characteristics of firm i that appears in the wave conducted at time t include age, firm nature, and firm proxies of creditworthiness. The county characteristics refer to the economic activity and the banking sector characteristics at time t,[7] while the term Φ_j corresponds to a matrix that contains country fixed effects. The country specific variables and the fixed effects help us to control for specific supply factors affecting all the firms in a given country. Equation (1) is estimated using a weighted least squares (WLS) regression.[8] The standard errors are clustered at country-wave-SME (SME and large firms) level.[9]

This methodology enables us to analyze whether the banks changed their loan policy after the introduction of the SF, increasing their lending to

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[7] We consider the whole banking sector of a given country because contrary to the tightening of monetary policy, which mainly affects small banks, the tightening of capital requirements reduces the supply of lending by both small and large banks (see Aiyar, Calomiris, and Wieladek, 2016).

[8] Other papers based on SAFE survey such as Ferrando, et al. (2016a, 2016b) also use weights to obtain summary statistics and in their regression analysis.

[9] Similar results are obtained using robust standard errors, clustered standard errors at country level or country-wave level. We opt for the clustered standard errors at country-wave-SME level as the baseline specification following Rogers' (1993) seminal work, which suggests that no cluster should contain more than five per cent of the data. In addition, Nichols and Schaffer (2007) suggest that the data should have at least 20 balanced clusters or 50 reasonably balanced clusters. While in the EU-27 sample the bias of the country cluster standard errors could be potentially limited; the bias for the other two samples, with a much lower number of countries, could be especially pervasive since any of the above mentioned conditions is satisfied.

SMEs. This hypothesis is similar to the one tested in the EBA (2016) report on the SME SF. EBA's (2016) differentiates between the EU and EA samples and uses the SAFE database. However, there are several differences worth mentioning between our study and that conducted by the EBA. One of the differences between the analyses is the time period. While we restrict our analysis to the waves before and after the implementation of the SF, the pre-SF period in the EBA report consists of all waves from the fifth to the ninth (i.e., April 2011 - September 2013) whereas the post-SF period corresponds to the eleventh and twelfth waves (i.e., April 2014 - March 2015).[10] The pre-SF used in the EBA report is significantly longer than the one in our study. In addition, the period around the SF was especially intense in terms of the use of non-standard measures such as the announcement and implementation of the two 3-year Longer-Term Refinancing Operations (LTRO) or the announcement of the OMT that could have affected lending activity. A second difference is the treatment of micro/small and medium-sized firms given that the EBA (2016) report relies only on the turnover criteria. This leads to the inclusion in the group of SMEs of firms that, according to the European Commission Recommendation, are large firms (more than 250 employees) but with a turnover of lower than 50 million EUR and so, potential beneficiaries of the Supporting Factor. However, these firms are in essence large firms with low turnover and probably are not the best candidates for banks to grant loans. In addition, our study differs from the EBA (2016) report in some estimation technicalities. In the interest of an easier interpretation of the estimates, the model is formulated as a linear probability model (LPM) instead of a probit model as in the EBA report.[11] In our view, these differences could cloud the identification of the impact of the SME SF and so, could explain any difference in terms of the results obtained in both studies.

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[10] Wave nine is excluded for Spain.
[11] In this sense, Ai and Norton (2003) document that the magnitude of the interaction effect in nonlinear models (e.g., probit model) does not equal the marginal effect of the interaction term, and its statistical significance is not calculated by standard software.

Table 2 reports the results of the estimation of equation (1). Each column in this table refers to the three different samples considered in our analysis: EU-27, EA-10, and EA-11. Independently of the sample employed, we find that SMEs are significantly more constrained. Moreover, in line with the EBA report, we note that the SME SF does not have a significant impact on the SME group. Hence, the empirical evidence suggests that the SME SF has not eased the SMEs access to credit.

The dummy SF itself does not exhibit a statistically significant effect for the first two samples but it does in the sample that consists of EA-11 countries and two waves before and after the SF. As discussed in Section 2.1, the use of this sample leads to a pre-SF period that spans from October 2012 to September 2013, and so, the estimated coefficient is affected by the role of the announcement of the OMT that is consistent with a positive impact on lending on the three types of firms. This result reinforces the use of the baseline sample.

The coefficients obtained for the control variables also suggest some interesting findings. Thus, individual or family firms are significantly more constrained than the rest of firms. It is probably due to the reduced size of these firms but also to the existence of informational asymmetries that could limit the access to funding. The fact that the access to credit significantly improves as the firm becomes older confirms the previous statement given that firm age can be considered as a proxy for relationship lending. Certainly, the firm credit quality is also an important input for banks given that firms become more constrained as the economic outlook or their credit history deteriorates. Most of the country specific factors are not significant due to the presence of the country fixed-effects. Only the efficiency variable exhibits a positive and significant effect, suggesting that the less efficient banking systems tend to restrict credit to SMEs to a higher extent.

[Insert Table 2 here]

3.2.   The effect of the Supporting Factor depending on the SME size

SMEs are not a homogenous group of firms in terms of their size, risk, and profitability among other features; neither, consequently, in terms of their access to credit. According to the EBA (2016) report, SMEs and large firm's riskiness show a cyclical pattern. During recessions, the indicators deteriorate for all firms, being more severe for small firms than for medium and large firms. In addition, medium-sized firms are relatively better performers. Although the group of SMEs is heterogeneous, banks benefit from the SF independently of whether they lend to micro/small firms or medium-sized firms. In light of the differences between firms according to their size, it appears plausible that banks do not treat micro/small firms as they do medium-sized firms and decide to benefit from the lower capital charge offered by the SF by lending to medium-sized firms. For this reason, it seems relevant to make a distinction between different types of SMEs.

We modify equation (1) by splitting the group of SMEs into two dummy variables depending on whether the firms are micro/small firms or medium-sized firms plus their interaction with the SF. Thus, we propose the following specification to disentangle the effect of the SF on the two groups of SMEs:[12]

$$
\begin{aligned}
D.\,&Credit\ Constrained_{it} \\
&= \alpha + \beta_1 Micro/Small_i + \beta_2 Medium_i \\
&\quad + \beta_3 Micro/Small_i\ x\ SF_t + \beta_4 Medium_i\ x\ SF_t + \beta_5 SF_t \\
&\quad + \Gamma Firm\ Characts_{it} + \Upsilon Country\ Characts_{jt} + \Phi_j + \epsilon_{ijt}
\end{aligned}
\tag{2}
$$

Equation (2) is estimated using a WLS regression with standard errors clustered at country-wave- size (micro/small, medium and large firms) level.

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[12] Section 4.5 provides additional evidence of this hypothesis by means of alternative estimation techniques.

Table 3 reports the results for the estimation of equation (2) for the three alternative samples: i) EU-27 countries (column (1)); ii) EA-10 countries (column (2)); iii) EA-11 using two waves to define the pre- and two waves to define the post-SF period (column (3)). In addition, we test the difference in the credit constraints between large firms and medium and micro/small after the introduction of the SF. To this end, we conduct an F-test to evaluate the linear combination of the coefficients obtained for the dummy variables referring to two types of SMEs and for their interactions with the SF dummy.

We find that micro/small and medium-sized firms were significantly more credit constrained than large firms before the introduction of the SF. However, credit rationing seems to be more severe for micro/small firms. These results are consistent for the three samples employed in our analysis. Specifically, when we use the EU-27 sample, the likelihood that micro/small firms face credit constraints is about 10% higher than for large firms whereas it is around 6.6% higher in the case of the other group of SMEs (i.e., medium-sized firms). This finding is in line with the fact that micro/small firms are riskier than medium firms, and hence, they are not treated equally to medium-sized firms by banks. However, we find that after the introduction of the SF, medium-sized firms are significantly less constrained than before the introduction of this policy. In fact, the probability of being credit constrained for large firms is 5% lower after the implementation of the SF. On the contrary, micro/small firms do not undergo a significant change with regard to the pre-SF period.

The last rows in Table 3 report the linear combination of the coefficients obtained for the dummy variables referring to two types of SMEs and for their interactions with the SF dummy. We observe that after the implementation of the SF, there are no significant statistical differences between medium and large firms in terms of credit constraints due to the beneficial effect that the SF had on the former. On the contrary, micro/small firms are more constrained than large firms before and after the appearance

of the SF in a similar order of magnitude. All these findings support the idea that banks tend to use the capital relief from the implementation of the SF to grant more loans exclusively to medium-sized firms but not to the whole spectrum of SMEs. The lower riskiness of medium-sized firms suggests that lower capital requirements do not necessarily lead to an increase in banks' risk-taking.

[Insert Table 3 here]

4. Additional evidence on the role of the Supporting Factor

In this section we carry out a set of robustness tests and extensions to identify the impact of the SME SF. We first try to disentangle the effect of the SF being dependent on the loan size given that the SF is only applied when the exposure of the bank to the firm is below a given threshold. Second, in a separate analysis, we deal with those large firms with access to the SME SF (i.e., firms with more than 250 employees but with a turnover of below 50 million). Third, in a separate analysis, we examine the effect of the SF on listed firms that can obtain funding through financial markets. Fourth, we perform a similar analysis using alternative definitions of constrained firms. Fifth, we analyze the robustness of our results by means of alternative estimation techniques.

4.1.   Dealing with loan size restrictions

One may argue that previous results should be interpreted with caution given that it is not possible to identify exactly which SMEs benefited from the existence of the SME SF. To be able to benefit, the total amount owed to the lending institution should not exceed EUR 1.5 million. In the previous analysis we assumed that all loans granted to SMEs could benefit from the SME SF but this is not the case if the exposition exceeds that amount.

For the eleventh wave onwards (i.e., post-SF period) the SAFE includes a question relative to the requested loan amounts. Thus, we now go one step further and extend equation (2) by splitting the micro/small and the medium categories for the post-SF period into two groups depending on whether they apply for a loan that exceeds EUR 1 million:[13]

$$
\begin{aligned}
D.\,Credit\;Constrained_{it} \\
&= \alpha + \beta_1 Micro/Small_i + \beta_2 Medium_i \\
&+ \beta_3 Micro/Small > EUR1M_i \, x \, SF_t + \beta_4 Medium \\
&> EUR1M_i x SF_t + \beta_5 Micro/Small < EUR1M_i \, x \, SF_t \\
&+ \beta_6 Medium < EUR1M_i \, x \, SF_t + \beta_7 SF_t + \Gamma Firm\;Characts_{it} \\
&+ Y Country\;Characts_{jt} + \Phi_j + \epsilon_{ijt}
\end{aligned}
\quad (3)
$$

where $Micro/Small > EUR1M_i \, x \, SF_t$ and $Medium > EUR1M_i \, x \, SF_t$ ($Micro/Small < EUR1M_i \, x \, SF_t$ and $Medium < EUR1M_i \, x \, SF_t$) are two dummy variables that are equal to one if a micro/small or medium-sized firm, respectively, applied for a loan of more (less) than EUR 1 million after the introduction of the supporting factor, and zero otherwise.

Around 4% (0.7%) of medium-sized (micro/small) firms apply for a loan that amounted to more than EUR 1 million. The implicit assumption is that any given bank receiving a loan application for more than EUR 1 million is more likely to have a total exposure to that firm that exceeds the maximum exposition to be able to benefit from the SME SF (i.e., EUR 1.5 million). Given that SMEs totally depend on bank funding, it is reasonable to assume that those SMEs applying for a loan of more than EUR 1 million could have other loans with the same bank. In this analysis the control group remains unchanged and consists of large firms that did not benefit from the Supporting Factor.[14]

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[13] The EUR 1 million threshold is the one corresponding to the highest interval. Firms should choose between the following intervals: i) up to EUR 25,000; ii) more than EUR 25,000 and up to EUR 100,000; iii) more than EUR 100,000 and up to EUR 250,000; iv) more than EUR 250,000 and up to EUR 1 million; v) over EUR 1 million.

[14] In addition, the ninth wave of the SAFE contains a related question about the size of the last loan that the firm has obtained in the last two years. However, we do not use this

Table 4 reports the results. In line with our expectations, those SMEs that apply for a loan that exceeds EUR 1 million do not experience an improvement in their access to credit. Indeed, we observe that access to credit of those micro/small sized firms that apply for a loan above the EUR 1 million threshold significantly diminishes. Moreover, medium-sized firms with loan applications below EUR 1 million were less likely to be constrained than other medium-sized firms with applications above that amount. This result supports the effectiveness of the SF but could be also linked to the regulatory treatment of SMEs with high credit exposition. SMEs are classified as retail exposures as long as their credit expositions do not exceed EUR 1 million in which case they are classified as corporate exposures. According to the EBA report (2013) on risk weighted assets (RWA), the average risk weights applied to SME retail exposures are significantly smaller than the ones applied to SME corporate exposures. Either from the side of the SF or from that of the firm classification as a retail or corporate institution, the results confirm that banks optimize their regulatory capital by granting loans to those SMEs that require less capital (i.e., with lower RWA) and that, in addition, are less risky.

[Insert Table 4 here]

4.2.   Dealing with large firms with access to the Supporting Factor

For a proper design of the identification strategy, we have excluded from the analysis those firms that can be considered as large firms according to the definition used by the European Commission (more than 250 employees) but with a turnover of below EUR 50 million and hence, are potential beneficiaries from the SF. We now extend the sample with this group of firms and estimate a variation of equation (2) in which we add a dummy

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variable because, contrary to the other questions, it applies to the previous two years and so, does not necessarily refer to the loan described in the survey that applies to applications during the last six months.

variable for this specific group of firms and its interaction with the SF dummy. Results are shown in Table 5.

[Insert Table 5 here]

We reveal that these firms were more constrained than other large firms with a higher turnover before the establishment of the SME SF. This suggests the existence of good lending practices given that these firms exhibit a lower productivity per employee than other large firms. This low productivity is also decisive in understanding the role that the SF has on this type of firm given that it does not contribute to improving their lending conditions. Not surprisingly, banks seem to prefer lending to medium-sized firms with a higher productivity, that is, firms with a lower number of employees and similar levels of turnover. It confirms that credit flowed in the right direction and the banks considered the quality of the firm to which they were lending within the group of firms that could lead to lower capital requirements.

4.3. Dealing with listed firms

Some of the firms included in the SAFE are listed firms. The type of market in which they are listed is not specified but among the listed firms there are SMEs. The number of listed SMEs is very small: 129 and 77 in the waves immediately before and after the SME SF, respectively. This offers a proper opportunity to analyze whether the SME SF had any effect on these firms and more importantly, whether the exclusion of these firms under the argument that they can obtain funding in financial markets is convincing. Thus, we use the same control group used in the baseline analysis (large firms that do not benefit from the SF) and use now a new single treatment group that consists of listed SMEs. Results for the corresponding estimation can be found in Table 6.

[Insert Table 6 here]

Contrary to the results obtained for non-listed SMEs, listed SMEs were not significantly more constrained than large firms before the introduction of the SF. Listed SMEs may be more financially sound and transparent than other SMEs since being listed involves the disclosure of much more information. Although in view of column (1) of Table 6, and as expected, one observes a negative coefficient for the interaction of the dummies corresponding to listed SMEs and SF, it is not significantly different from zero. In the case of non-listed medium-sized firms, they were more constrained than large firms before the implementation of the SF but they exhibited similar levels of constraints after that event. On the contrary, the introduction of the SF does not exert a significant effect on the degree of financial constraints faced by the listed SMEs compared to large firms because they were already treated similarly before that event.

Another interesting feature of the SF is also revealed here; it is especially positive and effective for those firms that did not have access to alternative sources of funding and for which bank loans are the only source for carrying out further investments. This supports the implementation of the SF and advocates the need for a proper analysis to deal with the situation of SMEs in order to define the optimal date for its withdrawal.

4.4.   Alternative methodology to study the effect of the Supporting Factor on SME access to credit

The results obtained up to now are based on the use of large firms without access to the SF as the control group of the study. Ideally, the control group should consist of SMEs that are not eligible for the application of the SF. We now perform a related experiment based on the direct comparison of similar types of firms before and after the event. Thus, we complement the previous results with an analysis based on the specific matching estimation technique developed in Abadie and Imbens (2002). This technique implements a nearest neighbor matching estimation for average treatment effects. The goal of this analysis is to estimate the average effect of the SME SF on the lending constraints. To this end, we compare outcomes between

treated and control observations using the nearest neighbor matching approach across firm characteristics. We implement exact matching in terms of the country in which the firm is located, the sector, and two dummy variables: one that indicates whether the firm is an individual/family firm or not and another one indicating whether the firm is autonomous or not. Note that the information on the sector of the firm is only available for SMEs and so could not be used in the previous analyses because the control group consisted of large firms for which this information is not reported. Additionally, firms are matched using the nearest neighbor in terms of their age. Thus, by means of the nearest neighbor matching technique we compare firms that are similar across several dimensions and only differ in the date in which they appear in the survey and apply for a loan: before or after the appearance of the SME SF.

Table 7 reports the results of the matching estimation for two samples. Panel A covers the ninth and the eleventh waves for all the firms located in the European Union (EU-28), except for Spain, for which we use the eighth and tenth waves. Panel B covers the ninth and eleventh waves for firms located in the Euro Area (EA-11), except for Spain, for which we use the eighth and tenth wave. Given that we match firms that belong to the sample country before and after the implementation of the SME SF, we can include Spain in the analysis.

Column (1) of Table 7 reports the results for the analysis in which the treated group consists of micro/small-sized firms after the implementation of the SME SF whereas the control group consists of similar micro/small-sized firms that operate in the same sector and are located in the same country, before the regulatory change. Columns (2) – (4) of Table 7 reports the same analysis for medium firms, large firms potentially eligible for the SME SF, and large firms that are not eligible, respectively. A negative coefficient in Table 7 indicates that the group of firms under study is, on average, less credit constrained after the implementation of the SF.

When comparing medium-sized firms, we observe that they are significantly less constrained following the introduction of the SF. This result persists independently of whether the sample consists of EU firms (Panel A) or EA firms (Panel B). However, we do not find significant differences for the group of micro/small firms and the two groups of large firms. These results are thus fully consistent with the ones presented in the regression analysis.

[Insert Table 7 here]

5. An experiment based on Spanish banks and firms

Instead of using the SAFE, in this experiment we use two databases at Banco de España: the Central Credit Register (CCR) and the Integrated Central Balance Sheet Data Office survey (CBI by its Spanish name). The first one consists of bank-firm level information at monthly frequency on the outstanding balances of loans that a given firm has in a given bank. The second one combines the information from the Central Balance Sheet Data Office annual survey and the mercantile registry and has annual frequency. We merge the two datasets to define the exposure of a given bank to each firm and also the characteristics of each firm. This merge enables us to classify the firms as micro/small or medium-sized firms according to the European Commission Recommendation. But more importantly, we can now properly define whether each specific bank can benefit from the application of the SF to the loans granted to a given firm. A bank can benefit from the use of the SF on the loans granted to a given firm if the previous exposure to that firm is lower than EUR 1.5 million.

The earlier adoption of the SF in Spain and the use of this dataset help us to design an experiment through which we can more efficiently isolate the effect of the SF from that of other coinciding events such as the announcement of the LTRO in June 2014 which might hamper the identification of this effect. Moreover, these datasets enable us to design an

experiment in which the treatment and the control groups consist of similar firms (either micro/small or medium-sized). Concretely, we propose a regression analysis in which the dependent variable (New_Loan_{ij}) is a dummy that takes value one if bank j increases its outstanding balance of loans to firm i during the period that spans from August 2013 (the month immediately prior to the introduction of the SF in Spain) to December 2013 (three months after the introduction date). The dependent variable is regressed on a dummy variable (SF_i) that is equal to one in the case that a given firm i represents an opportunity for bank j to benefit from the use of the SF (i.e., the exposure of the bank to that firm is below EUR 1.5 million on August 2013):

$$New\_Loan_{ij} = \beta SF_i + \Theta F_i + \Gamma B_j + \zeta RL_{ij} + \gamma_s + \varphi_l + \epsilon_{ij} \qquad (4)$$

where F_i denotes a matrix of firm characteristics, B_j is a matrix that contains bank characteristics and RL_{ij} is a proxy for the firm-bank relationship lending measured from the age of that relationship. The set of control variables is based on the one employed by Bentolila, Jansen and Jiménez (2016). Thus, the firm characteristics include measures of leverage (equity over total assets), liquid assets (over total assets), profitability (ROA), and size (logarithm of total assets). The set of bank characteristics also include leverage, liquid assets, profitability, and size and in addition we use the ratio of non-performing loans over total loans, the total use of resources from the Eurosystem over total assets, the ratio credit over deposits, and the ratio of loans to construction companies and real estate developers over total loans. Finally, γ_s and φ_l indicate the use of 3-digit industry and zip code fixed effects, respectively.

The coefficient β measures the changes in supply after the introduction of the SF to those firms that represent potential opportunities in terms of capital reliefs for the bank (i.e., exposure to that SME below EUR 1.5 million). We propose two regression analyses, one based on micro-small

firms and another one based on medium-sized firms. The standard errors are clustered at bank and firm level.

The results obtained for this analysis are reported in Columns (1) − (2) of Table 8. In the interest of brevity the coefficients for the control variables are not reported. The first column contains the results obtained for micro-small firms whereas the second one reports those obtained for medium-sized firms. Consistently with previous results, we observe that the introduction of the SF does not lead to a significant increase in the loans granted to micro/small firms. Note that this result could be influenced by the fact that the exposure of the banks to the micro-small firms was lower than EUR 1.5 million in 99% of the cases. Thus, the lack of significance of this coefficient also helps to show that banks did not grant new loans to micro-small firms in the quarter after the introduction of the SF. However, we observe that those medium-sized firms to which the bank had an exposure below EUR 1.5 million were more likely to obtain new loans after the introduction of the SF compared to other medium-sized firms to which the bank had an exposure above that threshold. In this exercise the number of cases with an exposure above the threshold established in the regulation concerning the SF is not negligible (11%). These results are consistent and complement the evidence documented for the European firms.

[Insert Table 8 here]

Indeed, the effect could not be specifically due to the SF factor as one expects that the banks aim to limit excessive exposure to any one firm and so, coefficient β could be equally positive and statistically significant during other periods. For that reason, we evaluate the magnitude of the coefficients in two different sample periods before and after the dates used to evaluate the effectiveness of the Supporting Factor.

To study the pre-SF period we consider the banks exposures in January 2013 and compare the change in the outstanding balances of loans between that date and May 2013. The results obtained under the same specification described in equation (4) are reported in columns (3) − (4) for the

micro/small and medium-sized firms, respectively. As expected no significant effect is found for the case of micro/small firms whereas a positive and significant effect is obtained for the case of medium sized-firms. With regard to the post-SF period we consider the exposures on March 2014 and the change in the outstanding balances of loans up to July 2014. This time span could be partially affected by the announcement of the LTRO in June 2014, which came into effect in September 2014, but, in any case, it helps to gain a better understanding of the effects caused by the implementation of the SF. Results for the two types of firms are reported in columns (5) – (6) and confirm what we found for the pre-SF period. However, the magnitude of the coefficients in columns (4) and (6) compared to the one in column (2) reveal that just immediately after the introduction of the SF, medium-sized firms were significantly more likely to obtain new loans. In particular, the magnitude of the coefficient that captures the likelihood with which medium-sized firms with an outstanding loan balance in a given bank below EUR 1.5 million obtained a new loan just immediately after the SF increases more than 40% compared to the other two sub-periods. This could be explained by the mechanical increase in the capital ratios at the date of the event as a result of applying the deduction not only to new loans granted to SMEs but also to all the SME exposures already held by the institution. These results confirm the effectiveness of the SF in improving the credit supply to those medium-sized firms that offered the opportunity of capital reliefs.

6. Conclusions

The introduction of the SME SF allows banks to reduce capital requirements for credit risk on exposures to firms with a turnover below EUR 50 million. This means that banks freed up capital resources that can be redeployed in the form of new loans. The SF is a temporary measure rather than a permanent mechanism to alleviate the effects of lending to SMEs during the crisis and it is intended to be gradually withdrawn as the

economy recovers. In this context, our paper aims to contribute to the discussion on the need and effectiveness of the SF on SME lending.

Our study documents that the SF alleviates credit rationing to medium-sized firms with access to the SF (i.e., with loans from a given bank that amount to less than EUR 1.5 million) but not to micro/small firms. Banks seem to differentiate between medium- and micro/small-sized firms, probably because the latter are riskier and could lead to higher costs of absorbing potential losses, to the extent that only the former benefit from the improvement in credit supply. Several extensions are used to isolate the effects of the SF on SME lending and make them clearly visible.

These results suggest that European banks have been aware of this policy measure and have optimized both their regulatory capital and their credit exposures by granting loans to the safest SMEs. However, the context of regulatory uncertainty about the duration of this policy measure could have damaged its effectiveness. Banks might be limiting their lending to SMEs that benefit from the SF if the duration of this measure is uncertain given that the withdrawal of this measure could mechanically increase their RWA, and lead them to require more capital in order to accommodate the regulatory ratios. Moreover, it seems necessary to monitor its effectiveness over time to improve our understanding and, probably, to consider potential variations. These variations could be based on the firms to which it applies or on the threshold regarding the limit of the amount owed by applicants; to guarantee a proper credit allocation to all types of SMEs.

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Table 1: Descriptive statistics

Table 1 reports the summary statistics obtained using weights designed to restore the proportions of the economic weight of each size class, economic activity and country. We provide the number of observations (N), the mean, standard deviation (SD), minimum (Min) and maximum (Max). We report the statistics for three samples: i) EU-27 refers to the European Union countries (without Spain) for the ninth and eleventh waves (i.e., April 2013 to September 2013 and April 2014 to September 2014); ii) EA-10 refers to ten Euro Area countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands and Portugal) for the ninth and eleventh waves (i.e., April 2013 to September 2013 and April 2014 to September 2014);iii) EA-11 refers to eleven Euro Area countries (EA-10 and Spain) for the eighth, ninth, eleventh and twelfth waves (i.e., October 2012 to September 2013 and April 2014 to March 2015).

| | EU-27 | | | | | EA-10 | | | | | EA-11 (2 Waves) | | | | |
Variable	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
D. Credit Constrained	6015	0,18	0,38	0	1	3694	0,19	0,39	0	1	8268	0,19	0,40	0	1
D. Micro or Small Firm	6015	0,48	0,50	0	1	3694	0,49	0,50	0	1	8268	0,50	0,50	0	1
D. Medium Firm	6015	0,24	0,43	0	1	3694	0,21	0,41	0	1	8268	0,22	0,41	0	1
D. Large Firm	6015	0,28	0,45	0	1	3694	0,30	0,46	0	1	8268	0,28	0,45	0	1
D. Individual or Family Firm	6015	0,83	0,38	0	1	3694	0,85	0,35	0	1	8268	0,83	0,37	0	1
D. Autonomous	6015	0,90	0,29	0	1	3694	0,92	0,28	0	1	8268	0,91	0,29	0	1
D. Age >10	6015	0,80	0,40	0	1	3694	0,82	0,39	0	1	8268	0,83	0,38	0	1
D. 10>Age>5	6015	0,13	0,33	0	1	3694	0,12	0,33	0	1	8268	0,12	0,32	0	1
D. 5>Age>2	6015	0,05	0,22	0	1	3694	0,04	0,20	0	1	8268	0,04	0,20	0	1
D. Firm Capital Improved	6015	0,34	0,47	0	1	3694	0,32	0,47	0	1	8268	0,32	0,47	0	1
D. Firm Economic Outlook Improved	6015	0,19	0,39	0	1	3694	0,15	0,36	0	1	8268	0,21	0,41	0	1
D. Firm Credit History Deteriorated	6015	0,16	0,36	0	1	3694	0,18	0,38	0	1	8268	0,18	0,39	0	1
D. Firm Interest Expenses Decreased	6015	0,24	0,43	0	1	3694	0,26	0,44	0	1	8268	0,28	0,45	0	1
Problem Loans/ Gross Customer Loans (%)	6015	8,74	7,63	1,17	36,25	3694	7,47	6,05	1,52	35,04	8268	8,08	5,95	1,35	35,31
GDP Growth (%)	6015	0,69	1,41	-3,20	5,20	3694	0,18	1,11	-3,20	5,20	8268	0,40	1,29	-3,20	5,20
Private Sector Debt to GDP (%)	6015	126,71	37,67	52,30	327,90	3694	129,14	31,80	99,50	266,70	8268	132,42	32,30	98,90	266,70
Cost-to-Income Ratio (%)	6015	66,37	7,43	37,38	94,00	3694	68,33	4,63	56,79	91,77	8268	66,53	6,46	51,45	91,77

Table 2: Effect of the Supporting Factor on the SME access to credit

Table 2 reports the WLS estimates of equation (1) for the three periods detailed in Table 1. The dependent variable (D. Credit Constrained) is a dummy that equals one when the firm applies for a loan or credit line and receives less than 75% of the requested amount (including the total rejection). The variable takes zero whenever the firm applies for a loan and receives more than the 75%. The variables of interest are: D. SME, D. After SF and D.SME x D. After SF. D.SME is a dummy variable that is equal to one if the firm is an SME and zero otherwise. D.After SF is a dummy variable that takes value one after the implementations of the SME SF and zero before. D.SME x D. After SF is the interaction of the two previous dummy variables. The set of control variables is self-explanatory in the way they are labeled. Standard errors are clustered at country-wave-SME (SME and large firms) level and are reported in brackets.*, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
	EU-27	EU-10	EU-11 (2-Waves)
D. SME	0.088***	0.076***	0.086***
	[0.021]	[0.023]	[0.015]
D. SME x D. After SF	-0.023	-0.012	-0.017
	[0.028]	[0.034]	[0.020]
D. After SF	0.026	0.033	0.038*
	[0.026]	[0.033]	[0.019]
D. Individual or Family Firm	0.032**	0.038**	0.013
	[0.014]	[0.018]	[0.015]
D. Autonomous	-0.015	-0.027	-0.016
	[0.020]	[0.025]	[0.017]
D. Age >10	-0.217***	-0.232**	-0.137*
	[0.077]	[0.100]	[0.072]
D. 10>Age>5	-0.162**	-0.165*	-0.092
	[0.071]	[0.093]	[0.066]
D. 5>Age>2	-0.099	-0.122	-0.040
	[0.085]	[0.113]	[0.079]
D. Firm Capital Improved	-0.030**	-0.027*	-0.003
	[0.012]	[0.015]	[0.012]
D. Firm Economic Outlook Improved	-0.050***	-0.057***	-0.083***
	[0.015]	[0.019]	[0.014]
D. Firm Credit History Deteriorated	0.183***	0.177***	0.189***
	[0.019]	[0.021]	[0.018]
D. Firm Interest Expenses Decreased	-0.060***	-0.069***	-0.065***
	[0.015]	[0.020]	[0.013]
Problem Loans/ Gross Customer Loans (%)	0.004	-0.006	-0.004
	[0.012]	[0.021]	[0.005]
GDP Growth (%)	0.013	0.014	0.011
	[0.014]	[0.041]	[0.015]
Private Sector Debt to GDP (%)	0.003	-0.000	0.003
	[0.003]	[0.008]	[0.003]
Cost-to-Income Ratio (%)	0.004**	0.002	0.004**
	[0.002]	[0.002]	[0.002]
Observations	6,015	3,694	8,268
R-squared	0.134	0.145	0.141
Country FE	YES	YES	YES

Table 3: Effect of the Supporting Factor on medium, micro/small firms' access to credit

Table 3 reports the WLS estimates of equation (2) for the three periods detailed in Table 1. The novelty with respect to Table 2 is the substitution of D. SME by two dummy variables depending on the SME size: D. Micro or Small firm and D. Medium firm. D. Micro or Small firm (D. Medium firm) is a dummy variable that takes value one if the firm is a micro/small (medium-sized) and zero otherwise. In addition, Table 3 includes the coefficients for the interaction of the two previous dummy variables with D. After SF. The set of control variables is self-explanatory in the way they are labeled. Standard errors are clustered at country-wave-SME size (i.e., micro/small, medium and large firms) level and are reported in brackets. At the bottom of Table 3 we report the F-test results of the linear combination of the coefficients obtained for the dummy variables referring to two types of SMEs and their interactions with D. After SF. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
	EU-27	EU-10	EU-11 (2-Waves)
D. Micro or Small Firm	0.105***	0.086***	0.102***
	[0.025]	[0.026]	[0.017]
D. Medium Firm	0.066***	0.064***	0.069***
	[0.020]	[0.021]	[0.016]
D. Micro or Small Firm x D. After SF	-0.005	0.015	-0.000
	[0.030]	[0.034]	[0.020]
D. Medium Firm x D. After SF	-0.053**	-0.067**	-0.050**
	[0.027]	[0.030]	[0.020]
D. After SF	0.024	0.032	0.038**
	[0.025]	[0.031]	[0.018]
D. Individual or Family Firm	0.023	0.031*	0.006
	[0.014]	[0.018]	[0.014]
D. Autonomous	-0.023	-0.036	-0.022
	[0.019]	[0.024]	[0.017]
D. Age >10	-0.204***	-0.220**	-0.125*
	[0.076]	[0.099]	[0.071]
D. 10>Age>5	-0.157**	-0.159*	-0.087
	[0.070]	[0.091]	[0.065]
D. 5>Age>2	-0.100	-0.122	-0.039
	[0.084]	[0.112]	[0.078]
D. Firm Capital Improved	-0.026**	-0.023	0.001
	[0.012]	[0.015]	[0.012]
D. Firm Economic Outlook Improved	-0.049***	-0.058***	-0.080***
	[0.015]	[0.018]	[0.014]
D. Firm Credit History Deteriorated	0.180***	0.174***	0.187***
	[0.019]	[0.021]	[0.018]
D. Firm Interest Expenses Decreased	-0.057***	-0.066***	-0.061***
	[0.015]	[0.020]	[0.013]
Problem Loans/ Gross Customer Loans (%)	0.003	-0.009	-0.005
	[0.010]	[0.017]	[0.006]
GDP Growth (%)	0.013	0.016	0.011
	[0.013]	[0.037]	[0.014]
Private Sector Debt to GDP (%)	0.003	0.000	0.003
	[0.003]	[0.008]	[0.002]
Cost-to-Income Ratio (%)	0.004**	0.003	0.004**
	[0.002]	[0.002]	[0.002]

Observations	6,015	3,694	8,268
R-squared	0.138	0.150	0.145
Country FE	YES	YES	YES
Ho: B[Median] + B[Median x SF]=0	0,013	-0,003	0.020
	[0.019]	[0.022]	[0.014]
Ho: B[MS] + B[MSxSF]=0	0.100***	0.101***	0.101***
	[0.022]	[0.027]	[0.016]

Table 4: Effect of the Supporting Factor on the SME access to credit depending on the loan size

Table 4 reports the WLS estimates of equation (3) for the three periods detailed in Table 1. The novelty with respect to Table 3 is that the variables relative to the SME size (i.e., micro-small and medium) are split into two for the post-SF period depending on whether the firm has applied for a loan that exceeds EUR 1 million. The estimates for the control variables are not reported in the interest of brevity. Standard errors are clustered at country-wave-SME size (i.e., micro/small, medium and large firms) levels and are reported in brackets. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) EU-27	(2) EA-10	(3) EU-11 (2-Waves)
D. Micro or Small Firm Loan	0.105***	0.086***	0.102***
	[0.025]	[0.026]	[0.017]
D. Medium Firm Loan	0.066***	0.065***	0.069***
	[0.020]	[0.021]	[0.016]
D. Micro or Small Firm Loan > EUR 1M x D. After SF	0.079	0.123*	0.186***
	[0.057]	[0.064]	[0.058]
D. Medium Firm Loan > EUR 1M x D. After SF	-0.007	-0.036	-0.020
	[0.025]	[0.031]	[0.021]
D. Micro or Small Firm < EUR 1M x D. After SF	-0.004	0.015	-0.001
	[0.030]	[0.034]	[0.020]
D. Medium Firm < EUR 1M x D. After SF	-0.049*	-0.060*	-0.042**
	[0.027]	[0.030]	[0.020]
D. After SF	0.024	0.031	0.037**
	[0.025]	[0.031]	[0.018]
Observations	6,015	3,694	8,268
R-squared	0.139	0.150	0.145
Country FE	YES	YES	YES
Firm Characteristics	YES	YES	YES
Country Characteristics	YES	YES	YES

Table 5: Dealing with large firms affected by the Supporting Factor

Table 5 reports the WLS estimates of a variation of equation (2) for the three periods detailed in Table 1. The novelty is the introduction of a group of firms that has been excluded from the rest of the analyses. Those firms are large firms according to the European Commission definition (i.e. more than 250 employees) but with a turnover of lower than 50 million EUR and so, affected by the SF. There are two new variables with respect to the specification in equation (2): D. Large Firms w/SF, which is a dummy that takes one for those firms and zero otherwise, and its interaction with D. After SF. The estimates for the control variables are not reported in the interest of brevity. Standard errors are clustered at country-wave-SME size (i.e., micro/small, medium, large w/SF and large w/o SF firms) level and are reported in brackets. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
	EU-27	EA-10	EA-11 (2 Waves)
D. Micro or Small Firm	0.101***	0.081***	0.100***
	[0.025]	[0.025]	[0.017]
D. Medium Firm	0.066***	0.063***	0.068***
	[0.020]	[0.021]	[0.015]
D. Large Firms w/SF	0.055*	0.047	0.045*
	[0.030]	[0.032]	[0.026]
D. Micro or Small Firm x D. After SF	-0.006	0.016	0.000
	[0.031]	[0.034]	[0.020]
D. Medium Firm x D. After SF	-0.055**	-0.068**	-0.049**
	[0.027]	[0.030]	[0.019]
D. Large Firms w/SF x D. After SF	-0.015	0.005	-0.001
	[0.037]	[0.049]	[0.033]
D. After SF	0.029	0.034	0.040**
	[0.026]	[0.030]	[0.018]
Observations	6,274	3,800	8,498
R-squared	0.144	0.155	0.140
Country FE	YES	YES	YES
Firm Characteristics	YES	YES	YES
Country Characteristics	YES	YES	YES

Table 6: Effect of the Supporting Factor on listed SMEs

Table 6 reports the WLS estimates of a variation of equation (1) for the three periods detailed in Table 1. The novelty is that the group of SMEs employed in the analysis is restricted to those that are listed. The control group (large firms) is the same used in Table 3. D. Listed SME is a dummy variable that takes value one if the SME is listed and zero if the firm is large. The estimates for the control variables are not reported in the interest of brevity. Standard errors are clustered at country-wave-SME (i.e., SME and large firms) level and are reported in brackets. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
	EU-27	EA-10	EA-11 (2 Waves)
D. Listed SME	0.047	0.048	0.036
	[0.036]	[0.059]	[0.048]
D. Listed SME x D. After SF	-0.055	-0.046	0.029
	[0.044]	[0.069]	[0.081]
D. After SF	0.017	0.030**	0.013
	[0.014]	[0.013]	[0.011]
Observations	825	456	1,037
R-squared	0.179	0.178	0.144
Country FE	YES	YES	YES
Firm Characteristics	YES	YES	YES
Country Characteristics	YES	YES	YES

Table 7: Additional evidence on the effect of the Supporting Factor on the SME access to credit

Table 7 shows an analysis based on the matching estimation technique developed in Abadie and Imbens (2002). This technique implements a nearest neighbor matching estimation for average treatment effects. The table reports the average effect of the SF on the lending constraints by comparing outcomes between the treated and control observations, using the nearest neighbor matching across the firm characteristics. We require exact matching in terms of the country in which the firm is located, the sector, and two dummy variables: one that indicates whether the firm is an individual/family firm or not and another one indicating whether the firm is autonomous or not. Additionally, firms are matched using the nearest neighbor in terms of their age. Panel A covers the ninth and eleventh waves for firms located in the EU with the exception of Spain (eighth and tenth waves). Panel B covers the ninth and eleventh waves for firms located in the EA with the exception of Spain (eighth and tenth waves). Column (1) reports the results for the analysis in which the treatment group consists of micro/small-sized firms after the implementation of the SF whereas the control group consists of similar micro/small-sized firms, in the same sector and located in the same country, before the regulatory change. Columns (2), (3) and (4) report the results for the groups of medium-sized firms, large firms with access to the SME SF and large firms without access to the SME, respectively. For each analysis we report the average treatment effect together with the standard errors and the number of observations. A negative coefficient in Table 7 indicates that firms are, on average, less credit constrained after the implementation of the SF. *, **, and *** denotes statistical significance at 10%, 5%, and 1% level, respectively. Standard errors are reported in brackets.

	(1)	(2)	(3)	(4)
Panel A: EU-28				
	Micro & Small Firms	Medium Firms	Large w/SF Firms	Large Firms
Treatment Effect	-0.009	-0.030*	0.011	0.012
	[0.014]	[0.016]	[0.041]	[0.027]
Observations	4271	2607	320	678
Panel B: EA-11				
	Micro & Small Firms	Medium Firms	Large w/SF Firms	Large Firms
Treatment Effect	0.001	-0.050**	-0.010	0.021
	[0.017]	[0.022]	[0.072]	[0.033]
Observations	2957	1524	152	488

Table 8: Effect of the Supporting Factor on the Spanish SME access to credit depending on the loan size

Table 8 reports the OLS estimates of equation (4) in which the dependent variable in columns (1) - (2) is a dummy variable that takes value one if bank j increases its outstanding balance of loans to firm i during the period that spans from August 2013 (the month immediately prior to the introduction of the SF in Spain) to December 2013. The dependent variables in columns (3) - (4) on the one hand and (5) - (6) on the other refer to different time periods (January to May 2013 and March to July 2014, respectively). Results in columns (1), (3), and (5) are obtained for a sample of micro/small firms whereas the ones in columns (2), (4), and (6) correspond to a sample of medium-sized firms. The dependent variable is regressed on a dummy variable that is equal to one in the case that a given firm i represents an opportunity for bank j to benefit from the use of the SF (i.e., the exposure of the bank to that firm is below EUR 1.5 million on August 2013) and a series of control variables (firm, bank, and bank-firm characteristics plus fixed effects for industry and ZIP code). The estimates for the control variables are not reported in the interest of brevity. Standard errors are clustered at firm and bank level and are reported in brackets. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
D. Micro or Small Firm < EUR 1.5M	0.004		0.014		0.005	
	[0.022]		[0.021]		[0.022]	
D. Medium Firm < EUR 1.5M		0.085***		0.061***		0.058***
		[0.018]		[0.014]		[0.016]
Observations	348,680	20,158	361,784	23,394	354,587	20,566
R-squared	0.061	0.109	0.253	0.276	0.055	0.108
Firm Characteristics	YES	YES	YES	YES	YES	YES
Bank Characteristics	YES	YES	YES	YES	YES	YES
Firm-bank Characteristics	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
ZIP Code FE	YES	YES	YES	YES	YES	YES