Banc Ceannais na hÉireann
Central Bank of Ireland
Eurosystem

Research Technical Paper

SME access to finance in Europe: structural change and the legacy of the crisis

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Vol. 2019, No. 10

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Abstract

Small and Medium Enterprise (SME) access to credit deteriorated during the financial crisis and credit constraints remain high for some euro area countries. This paper investigates the factors linked to the variation in SME credit access across euro area countries. After controlling for the fundamental performance and characteristics of firms and bank funding costs, I investigate the financial and macroeconomic channels that explain variation in credit constraints across countries and time. The paper combines approaches taken in the literature, extends the analysis to the post-crisis period, distinguishes between alternative measures of credit constraints and incorporates the role of soft information. The most economically important channels associated with SME access to finance are found to be the soft information channel and firm indebtedness. Bank competition and the condition of bank balance sheets are also found to have economically important relationships with SME access to finance.

JEL classification: G01, G21, D22, D82, E66.

Keywords: access to finance, SMEs, financial crises, soft information, firm indebtedness, bank competition, bank balance sheets, capital markets union.

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I thank Sarah Holton, Fergal McCann, Jane Kelly, Raffaele Giuliana, Niall McGeever and participants at the Central Bank of Ireland Economic Seminar Series for comments on earlier drafts. The views in this paper are those of the author only and not of the Central Bank of Ireland or the ESCB.

Non-Technical Summary

In the euro area, SMEs heavy reliance on banks for financing leaves these firms vulnerable to banking shocks. In the context of the financial crisis and a fragmented capital market across Europe, the European Commission introduced a plan for a Capital Markets Union to address these challenges by both deepening and widening capital markets, with specific reference to SMEs.

In this paper, I investigate key financial and macroeconomic channels associated with the credit constraints of SMEs across Europe to inform policy making. I model a number of channels constraining SME access to finance over the period of the crisis and subsequent recovery (2010 H2 to 2017 H2). Following the methodologies applied in previous literature, I model these channels after taking into account the fundamental performance and characteristics of firms applying for credit as well as the cost of bank funding. Credit constrained firms which did not apply for credit because of potential rejection are distinguished from other types of credit constraints to better understand this specific type of constraint.

The findings from the modelling show that firms with better performance in terms of profitability, credit history and capital are less credit constrained and smaller firms with lower employment and turnover are more credit constrained. These factors have a larger impact on firms discouraged from applying for credit. Lower bank funding costs, following more accommodative monetary policy, are shown to ease credit constraints for SMEs after taking into account firm performance and characteristics. Among the channels found to be linked to increased credit constraints of SMEs are structural changes, such as bank branch closures (a soft information channel) and a less competitive lending market. The legacy of the financial crisis is also found to have constrained credit for firms through a deterioration of firm and bank balance sheets. Structural changes, in particular, are found to increase SME credit constraints further through discouragement of SMEs from applying for credit in the first instance, even after accounting for firm performance and characteristics. The most economically important of these channels is found to be the soft information channel and firm indebtedness.

The evidence presented in this paper provides a basis for which to prioritise the legislative agenda. Specific channels through which policy can alleviate credit constraints is through the strengthening of local financing networks and greater competition. The evidence also points towards the importance of policies to help resolve impaired bank and firm balance sheets following the crisis and to improve future resilience.

1 Introduction

Small and Medium Enterprises (SMEs) in the euro area rely heavily on bank finance and so are vulnerable to banking shocks.[1] The financial crisis resulted in a direct negative impact on bank balance sheets and exposed vulnerabilities where firms had elevated leverage. Structural changes occurred in the banking sector following the crisis, limiting access to finance for SMEs. For instance, lending distribution channels declined, limiting the capacity of banks to obtain soft information about firms' ability to repay, as banks sought cost reductions through branch closures. The intensity of bank competition has also weakened as banks reduced their balance sheets or exited the market through failure, acquisition or withdrawing to their home market.

Across the euro area, bank dependent SMEs were confronted with various credit constraints and fragmented capital markets. In response to these and other challenges, the European Commission formulated a policy to develop a Capital Markets Union (CMU). The CMU aims to open cross border lending channels and risk-sharing while diversifying funding sources. This includes funding through equity and securities markets, in order to reduce vulnerability to banking shocks. The policy also included a specific recognition of the challenges to SME access to finance including actions to address information barriers, financing networks, non-performing loans on bank balance sheets and business insolvency.

In this paper, I study SME credit access across euro area countries with the aim of informing policy makers of the key factors associated with SME access to finance. The analysis is undertaken accounting for three key aspects of bank lending; (i) the fundamental performance and characteristics of the firm (ii) bank funding costs and (iii) financial and macroeconomic channels associated with bank credit constraints. The analysis considers credit constraints for firms which applied for credit and where firms were discouraged from applying because of potential rejection. The aim of this analysis is to examine whether credit constraints are explained by additional financial and macroeconomic channels conditional on accounting for the fundamental performance and characteristics of firms and the cost of bank capital funding. The additional financial and macroeconomic channels include the unemployment rate, the Non-Financial Corporation (NFC) credit to GDP ratio, the share of non-performing loans on bank balance sheets, the bank lending margin as an indicator of competition and the

[1] See chart 6 on page 14 of the ECB/EC 'Survey on the access to finance of enterprises' for bank overdraft and bank loan use and relevance

number of bank branches as a proxy of the soft information channel.

This analysis draws on various strands of the literature to explore multiple channels through which SME access to finance is constrained, in a single empirical framework, from the crisis period to the post-crisis recovery period (2010 H2 to 2017 H2).

I find evidence to suggest that the most economically important channels associated with SME access to finance are through the soft information channel in bank branch networks and the level of indebtedness on firm balance sheets. Bank competition and the condition of bank balance sheets are also found to have economically important relationships with SME access to finance. This evidence suggests that the key factors driving access to finance can be conceptualised into structural factors, such as the extent of bank branch networks and bank lending competition, and legacy consequences of the financial crisis on firm and bank balance sheets. Structural factors in particular tend to increase firms discouragement with applying for bank credit at all.

The findings provide an empirical basis for prioritising the legislative agenda. The evidence tends to support the efforts of CMU policy actions to strengthen local financing networks and competition. Among these initiatives is exempting local credit unions in all EU Member States from the scope of the EU's capital requirements rules for banks while maintaining national safeguards proportional to the risks. The aim of this policy is to strengthen local financing networks. Further initiatives include supporting secondary markets for non-performing loans to restore bank balance sheets and fostering convergence of insolvency proceedings for the timely restructuring of distressed balance sheets of viable firms.

2 Literature and theoretical background

The literature on SME access to finance considers both firm and bank drivers. For SMEs wishing to gain access to credit, the application process for bank credit involves both hard quantitative information and more difficult to record soft information. Hard information is based on the fundamental performance and characteristics of the firm obtained from financial accounts and other records. Soft information is gained through interactions and monitoring of the borrower and is held as private information by the prospective lender (Diamond 1984; Allen & Carletti 2008). On the bank side, the condition of both the firm's and the bank's balance sheet, and the competitive market

for bank lending all play a part in the decision to grant credit or not.

With regard to hard information, this type of information is easier to collect, store and transfer electronically but poses difficulties for informationally opaque firms, which are typically smaller, lacking the resources to prepare detailed records of company performance, and not legally required to do so. The evidence in the literature supports the importance of the recorded performance of firms for access to finance. Blanco & Jiménez (2018) merge data on loan applications and firm financial accounts from the central credit register for Spain to examine firm performance in the recovery period following the financial crisis. The findings from their paper suggest that access to credit for firms became more sensitive to the health of firm balance sheets (indebtedness and financial burden) during the recovery period. The paper also finds that relationship lending (number of bank relationships that a firm has) are associated with better access to finance, underscoring the importance of banks' private information about firms.

A recent discussion on the meaning and importance of soft information is found in Liberti & Petersen (2018). Soft information is difficult to code in numbers and often communicated in text. This type of information includes future business plans, subjective assessments of the firm and management team as well as contextual information about business specific circumstances. The value of this soft information may not be apparent at the outset of lender-borrower interactions, in contrast to hard information. Berger & Udell (1995) suggest soft information is collected in person and hence linked to relationship banking through the production of information about the prospective borrower held privately by the respective bank. It is possible to harden soft information, for example by using rating scales and indices, but often ratings are subjectively interpreted and information, such as context, is lost. Furthermore, soft information is difficult to transmit, both over geographical distances and through the hierarchies of large organisations (Stein 2002; Degryse & Ongena 2005; Mian 2006; Liberti & Mian 2008). Petersen & Rajan (2002) find that more informationally transparent firms with formalised financial records have a higher probability of their loans being approved. Beck et al. (2018) find that relationship banking alleviates credit constraints during a cyclical downturn using cross sectional data for 2008-09, with the strongest effects found for smaller and more opaque firms. However, no evidence is found in the paper to indicate that relationship banking reduces credit constraints during a boom period (a cross section for 2005).

The success of the credit applications depend on both the financial health of the firm but also the condition of bank balance sheets. Evidence in the literature suggests this is the case particularly following a financial crisis. Jiménez et al. (2012) estimate

that higher short-term interest rates or lower GDP growth, reduce loan granting, with stronger effects for banks with low capital or liquidity. Jiménez et al. (2017) find that firm balance sheet strength affects loan applications during both good and crisis periods but bank balance sheet strength (measured by the bank capital ratio) affects the granting of loan applications only during a crisis. Furthermore, Lawless et al. (2015) finds that higher debt burdens (measured by debt-to-turnover) have significant negative effects on all measures of firm performance, in particular investment, employment and indicators of financial distress.

The structure of the bank lending market in terms of the market power of lenders can also increase credit constraints. More market power among lenders limit access to finance through the quantity or cost of finance. For instance, Carbo-Valverde et al. (2009) examines two measures of market power in the banking sector; the Lerner index (a price-cost margin measure) and the Hirshman-Herfindahl Index (HHI, a measure of market concentration). The Lerner index is interpreted as a measure of market power with the hypothesis that less competition will increase credit constraints. Alternatively the HHI tests an information hypothesis such that banks are incentivised to invest in soft information at higher levels of market power. The evidence more clearly supports the market power hypothesis. The Lerner index has a large and positive effect on the probability that a firm is credit constrained and is found to be a more reliable indicator than the HHI. Ryan et al. (2014) also investigates the role of market power of banks, measured by the Lerner index. They find increased market power increases financing constraints for SMEs after controlling for the availability of profitable investment opportunities.

Identifying credit constraints should take into account all relevant factors relating to firms, banks, financial and macroeconomic conditions across countries. Rottmann & Wollmershäuser (2013) model firm-specific factors such as the current state of the business as well as firms' perceptions regarding restrictive loan supply. The authors isolate a credit crunch indicator after controlling for firm fundamentals and bond yields to account for the banks' risk free alternative. They find the probability of a credit crunch in Germany was highest in 2003-04 during the burst of the New Economy bubble, lower during 2006-08, and with weaker indications of a credit crunch during the crisis period to 2010. Holton et al. (2013) extend the methodology of Rottmann & Wollmershäuser (2013) further to a third stage to investigate the role of financial and macroeconomic conditions. They find that credit tightens when the real economy is weaker and private debt levels are higher. With regard to firm fundamentals, they find that smaller firms and firms with lower turnover are likely to have loan applications rejected while firms which record improvements in internal funds, credit history or capital positions are less likely to

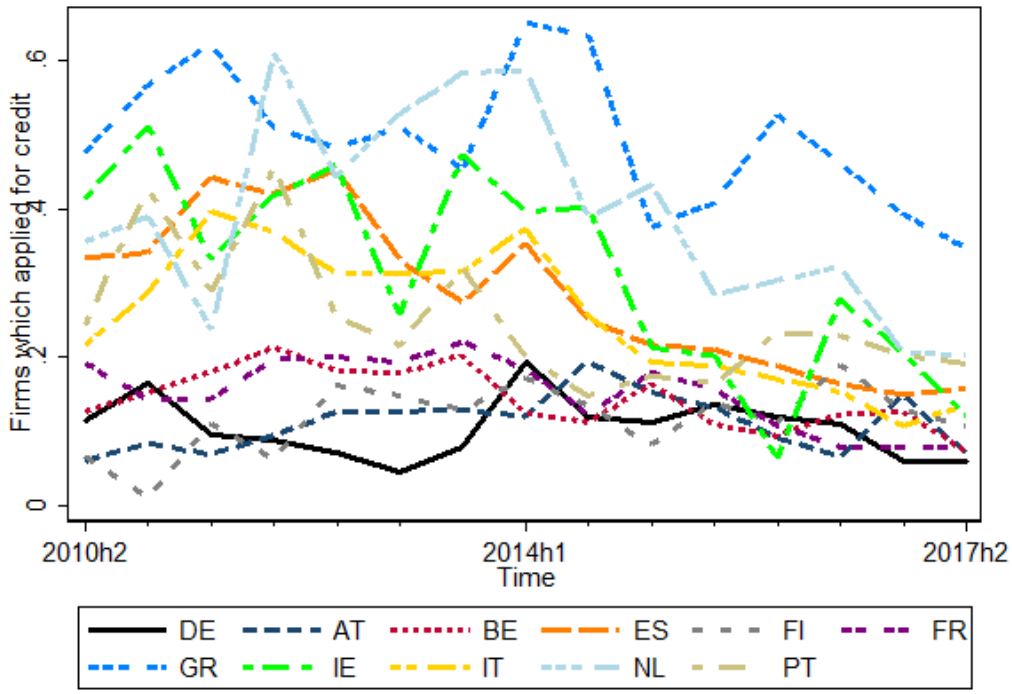
experience adverse credit conditions. Öztürk & Mrkaic (2014) also find that an increase in bank funding costs and firm indebtedness are negatively associated with access to finance for firms in stressed economies. Micro and small firms are found to have less access to finance than medium or large firms.

3 SME access to finance and the policy context

During the crisis, challenges to access to finance were coupled with difficult economic circumstances and the fragile balance sheets of firms and banks. Before the crisis, firm indebtedness had grown to elevated levels in some countries, increasing vulnerability when the financial crisis occurred. Furthermore, banks in some countries experienced challenges to balance sheet quality as loans originated in the pre-crisis period changed to non-performing in difficult economic circumstances during the crisis. It is clear from the euro area credit constraints data that the bank lending market is fragmented (see Figure 1). For instance, Greece generally records the highest credit constraints while Austria has one of the lowest, with little change over time. In contrast, credit constraints in Spain declined from being a country with one of the highest credit constraints in the euro area to credit constraints more typical of the euro area. A change to a more accommodative monetary policy alleviated the cost of bank funding reducing credit constraints across the euro area, including through the communication of a commitment to "do whatever it takes" by ECB president Mario Draghi and announcing the subsequent Outright Monetary Transactions (OMT) program in 2012 (Ferrando et al. 2017). However, substantial variation in credit supply occurred with some Member States experiencing greater contractions in credit supply than others.

The legacy of the crisis entailed a period of consolidation with a reduction in bank branch networks and competition in some countries as banks faced non-performing loans on balance sheets, acquisitions by other banks, exited to consolidate in home markets or failed outright.

Figure 1. Share of credit constrained firms - firms which applied for credit



Source: ECB/EC SAFE

At the EU level, the policy response to diverging credit constraints was included in a proposal for the CMU, first announced in 2014 (European Commission 2015). The CMU contains policies aimed at both deepening and integrating lending across the EU with specific reference to lending to SMEs. Capital markets were to be deepened by facilitating non-bank financing such as venture capital and equity financing (including access to public markets) at the EU level, promoting innovative forms of corporate financing such as crowdfunding, the development of an EU-wide framework for covered bonds, and similar structures for SME loans. Included in these measures was the recognition of the information challenges faced by firms with measures to strengthen the feedback given by banks declining SME credit applications, promote best practises, support advisory capabilities and develop pan-European information systems. The CMU also aims to strengthen financing networks by exempting local credit unions in all EU Member States from the scope of the EU's capital requirements rules for banks, while maintaining national safeguards proportional to the risks, to strengthen local financing networks. Further integration of the capital markets was to be achieved through measures to remove barriers to cross-border investment and achieve convergence in cross border insolvency proceedings.

At the country level, the case of Ireland is illustrative of public policy interventions to support SME lending, particularly in a period of constrained credit conditions. The

policy environment in Ireland includes a SME Bank (the Strategic Banking Corporation of Ireland — SBCI, established in 2014), a loan guarantee scheme, direct lending to SMEs and interventions targeted at micro and start-up firms. The SBCI has been active in providing credit support through bank and non-bank partners in the event of external shocks from Brexit (the Brexit loan scheme), working capital support to farms facing price and income volatility (Agriculture Cashflow Support Loan Scheme) and more recently supporting loans for long-term investment (Future Growth Loan Scheme). The loan guarantee scheme provides an 80 per cent state guarantee to banks against losses on eligible SMEs which lack adequate collateral, require refinancing due to the exit of a lender, or request lending for a novel business market, sector or technology. Direct lending to SMEs in Ireland is undertaken via commercial investments (through the Ireland Strategic Investment Fund — ISIF) in private sector entities who in turn lend directly to SMEs. Targeted interventions for start-up financing in Ireland include loans and funds for venture capital (Seed and Venture Capital Funds), business angel tax incentives (Employment Incentive and Investment Scheme) and co-investment with the European Investment Fund (European Angels Fund). Direct lending to micro and start-up enterprises is undertaken by Microfinance Ireland and financed through the government Micro Enterprise Loan Fund. A policy intervention uncommon in OECD countries but present in Ireland is the establishment of a credit mediation body (Credit Review Office — CRO) in 2010 (Organisation for Economic Cooperation and Development 2018). The CRO assists in appealing SME lending decisions where it judges the application to be viable. Recently, a credit registry has been established and extended to all business loans in 2018 to help reduce information asymmetry and improve credit screening. The policy instruments discussed above provide a non-exhaustive illustration of the kind of financing supports provided to SMEs in Ireland and elsewhere in Europe.

4 Data description and summary

Data for this study is obtained from multiple sources. Firm level data is obtained from the ECB/EC Survey on the Access to Finance of Enterprises (SAFE) for the period 2010 H2 to 2017 H2.[2] The key measure of credit constraints used as the dependent variable for this analysis is calculated from this data source. These data are also used to account

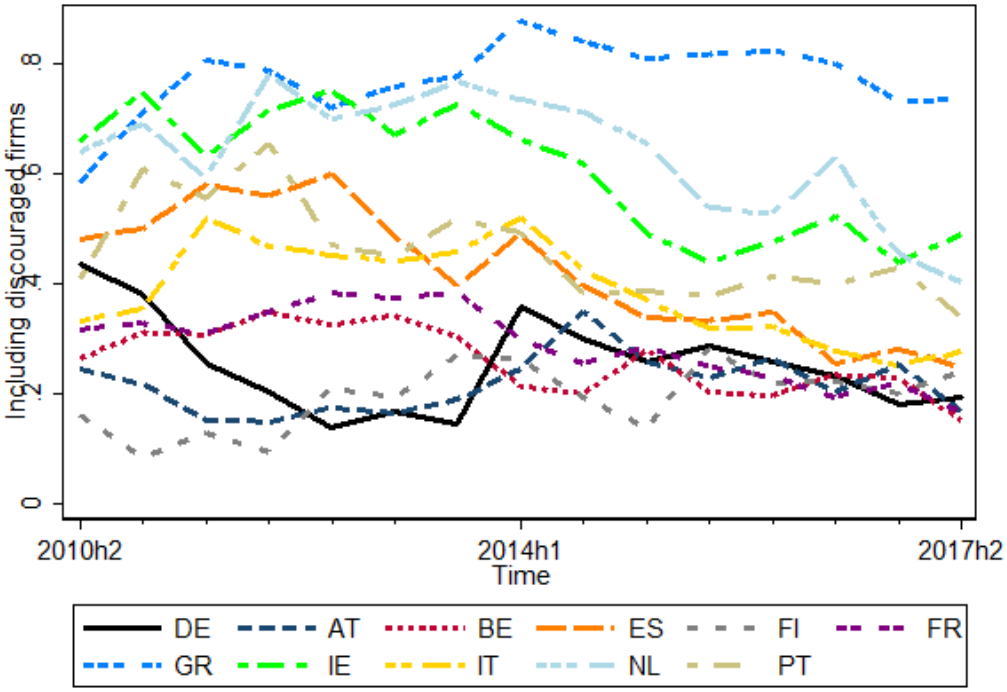
[2]The data used in this study begins in 2010 H2 as sample sizes for smaller countries increased substantially in the 2010 H2 wave of the survey, allowing for greater within country statistical power across a broader range of euro area countries. The full list of euro area countries includes: Austria (AT), Belgium (BE), Germany (DE), Spain (ES), Finland (FI), France (FR), Greece (GR), Ireland (IE), Italy (IT), Netherlands (NL) and Portugal (PT).

for the fundamental characteristics and performance of firms in the empirical model.

Credit constraints of SMEs may be defined broadly to include where; (i) loans were rejected or the firm received less than 75 per cent of the amount requested, (ii) the firm refused to proceed with the loan because of the interest cost. As discussed in section 3, a review of credit constraints using this definition, over time and between countries, reveals a good deal of variation and demonstrates credit constraints remain high in many euro area countries even as recently as 2017 H2 (see Figure 1 in section 3).

The definition of credit constrained firms may also be broadened further to include; (iii) discouraged firms which are those firms "which did not apply for credit because of possible rejection" (see Figure 2). This broader definition of credit constraints is aimed at reducing measurement error. Discouraged borrowers are included to capture demand not reflected in loan applications, but which is an important aspect of insufficient supply, namely those firms which have demand for borrowing but which are not captured in supply data measured by credit applications data alone. Therefore, disregarding discouraged borrowers would risk measurement error in the supply of credit. Discouraged borrowers can be the result of an efficient market outcome if firms are discouraged due to poor performance and higher risk (Ferrando & Mulier 2015, Han et al. 2009). However, if bank screening is ineffective or application costs are high due to the lack or loss of local bank branches for example, some firms with good performance become discouraged from applying for credit and discouragement becomes a less efficient market outcome (Kon & Storey 2003). For this reason, the broader measure is preferred and is outlined in Table 7 in the appendix. The broader measure of credit constraints including discouraged borrowers demonstrates similar trends to the narrower measure (excluding discouraged borrowers) but the level of credit constraints is higher as a result of including discouraged borrowers. The data series also shows a smoother trajectory — thus reducing statistical noise in the empirical model estimation.

Figure 2. Share of credit constrained firms - including discouraged firms



Source: ECB/EC SAFE

Note: Credit constraints in this chart include where a loan application was rejected, the amount received was less than 75 per cent of the amount requested or the firm refused to proceed with the loan because of the interest cost.

The SAFE survey also provides a number of firm-level variables capturing the fundamental characteristics such as employment size class, turnover bands, age bands and ownership structure. The latter of which is a proxy for internal funding opportunities but could also capture more complex loan applications. There are also a number of independent variables accounting for firm performance such as changes in profitability, credit history and capital. Detailed descriptions of these variables are found in Table 7 in the appendix. Table 1 shows the mean values of the key firm fundamentals variables from the ECB/EC SAFE survey in the baseline sample used for estimations over the period 2010 H2 to 2017 H2. The data indicate that, across all countries and time periods, just over one in three SME responses referred to being credit constrained according to the broadest measure. In terms of firm performance, one in five SMEs reported a deterioration in credit history, similar to the share of firms reporting a deterioration in own capital, while 46 per cent of firms reported falling profits.

Table 1. Mean values for key micro variables

	Mean
Credit constrained	0.366
Micro	0.394
Small	0.324
Medium	0.282
Turnover up to 2 million	0.528
Turnover over 2 to 10 million	0.269
Turnover over 10 up to 50 million	0.172
Turnover over 50 million	0.031
Subsidary	0.072
10 years or more	0.809
5 years, up to 10 years	0.128
2 years, up to 5 years	0.052
Less than 2 years	0.012
Profits improved	0.254
Profits unchanged	0.288
Profits decreased	0.458
Credit history improved	0.267
Credit history unchanged	0.527
Credit history deteriorated	0.206
Own capital improved	0.254
Own capital unchanged	0.518
Own capital deteriorated	0.223
Observations	29210

Weighted calculations, ECB/EC SAFE, 2010 H2 to 2017 H2
Size classes are defined as follows; Micro, (1-9) employees, Small, (10-49) employees, Medium, (50-249 employees).

Financial and macroeconomic indicators are drawn from multiple sources. The cost of bank funding can be proxied by a number of variables. The deposit rate on outstanding deposits from both households and non-financial corporations is an important measure of banks' funding costs and are influenced by changes in monetary policy. Alternatively, the ten-year bond yield (both from the ECB Statistical Data Warehouse) measures the risk free rate and bank financial distress is proxied by bank credit default swaps (CDS) data from Thomson Reuters Datastream. The preferred measure of bank funding costs is the deposit rate as during the financial crisis the difficulties posed to both bank and government finances and the interaction between the two resulted in a challenge to sovereign bond yields and bank CDS rates when sovereign default became a credible scenario. The deposit rate better approximates bank funding costs and may also be interpreted as capturing the functioning of the monetary policy transmission mechanism on lending constraints. This interpretation is of particular importance given the accommodative monetary policy stance aimed at alleviating the bank cost of funding

and improving access to credit in the period examined.

At a country level, general economic conditions are examined using the unemployment rate data from Eurostat. The financial condition of both firm and bank balance sheets are measured at a country level by an indicator of the domestic NFC credit (ECB SDW) to GDP (Eurostat and Central Statistics Office, Ireland) ratio for the former and the share of non-performing loans on bank balance sheets, from the IMF Financial Soundness Indicators, for the latter.[3] The bank branch network is recorded as the number of domestic banks branches (ECB SDW) per 10,000 of the population (Eurostat). The bank branch network is the distribution network through which soft information about firms is obtained. A greater number of bank branches per 10,000 of the population captures the ability of bank branches to serve the local population and hence the distribution channel of soft information. Competition is measured by bank lending margins (ECB SDW) with higher margins indicative of lower competition. Mean values for these data by country are presented in Tables 8 - 10. Further details about the definition of these variables can be found in Table 7 in the appendix.

A visualisation of the country-level data is provided in Figures 11-18 in the appendix. The key developments of the financial crisis and the recovery period are apparent from the illustrations. The proxy for general economic conditions, unemployment in Figure 11, shows how unemployment increased in some economies before recovering, albeit with variation across countries. Stressed countries like Greece experienced a large increase in the unemployment rate between 2010 and 2013 before recovering over the remainder of the period, while Germany experienced declines in the unemployment rate throughout the sample period. Firm indebtedness in Figure 12 reduced in many countries, especially in those countries with comparatively high indebtedness (Spain, Ireland and Portugal). Bank balance sheets deteriorated during the crisis, before recovering in some countries (Ireland, Spain, Portugal), or worsening further in some cases (Greece) as shown in Figure 13. At the same time, structural challenges have an impact on bank lending with bank competition (lending margins) weakening in some countries (Spain, Greece, Ireland, Portugal), often in those countries where bank balance sheets deteriorated (Figure 14). Banks are faced with a need to reduce operating costs while also maintaining the soft information channel. As banks reduced the number of branches in all countries across the euro area, the scope for gathering soft information

[3]For Ireland, a measure of modified total domestic demand is obtained from the Central Statistics Office. Irish GDP is distorted by the activities of large multinational enterprises which do not reflect domestic economic activity such as trade in aircraft by aircraft leasing companies and the imports of intellectual property. The modified measure of final domestic demand accounts for these distortions.

is reduced with the largest declines in branches occurring in Spain. (Figure 15).

The cost of bank funding is another key channel through which access to finance may be affected. For all three measures of the cost of bank funding, the deposit rate (Figure 16), bank CDS rates (Figure 17) and 10 year sovereign bond yields (Figure 18), the impact of the OMT would seem to be prevalent following their announcement in 2012 H2. Bank funding costs fell across the euro area countries but particularly in those countries with the highest cost of bank funding (Greece, Ireland, Spain and Portugal).

5 Methodology

Bernanke et al. (1991) define a credit crunch as a leftward shift in credit supply which cannot be explained by normal determinants such as the quality of firms or the risk-free alternative for banks. The empirical approach adopted in this paper models credit constraints in bank credit supply along the lines of the definition of a credit crunch put forward by Bernanke et al. (1991). The model is adapted to control for bank funding costs rather than the risk free rate. As discussed in Section 4, the nature of the financial crisis in the euro area means sovereign bond yields — a typical measure of the risk free rate — were so negatively affected in some member states to the extent that they may no longer be considered 'safe' and better approximate bank funding costs. The empirical methodology draws on the approach of Rottmann & Wollmershäuser (2013) to derive a credit crunch indicator and follows Holton et al. (2013) to extend the modelling to investigate financial and macroeconomic factors driving credit constraints for SMEs.

In the first stage, bank credit constraints γ are modelled in a linear probability model (Ordinary Least Squares) as a function of the fundamental performance and characteristics, x, of each firm i in sector s, country c, and each cross section of time t. Included in the model are sector dummies θ and country-time dummies δ which account for sector, country and time specific factors not controlled for by the firm fundamental characteristics.

$$Stage\ 1 : \gamma_{isct} = \alpha_{isct} + \sum_{k=1}^{K} \beta_k x_{isct} + \delta country - time_{ct} + \theta sector_{ict} + \epsilon_{isct} \qquad (1)$$

Following the estimation of the stage one equation, the country-time coefficients δ from stage one are used as the dependent variable. These country-time coefficients measure cross country variation in credit constraints conditional on firm fundamental factors accounted for in stage one and relative to Germany in 2010 H2. The second

stage of the model involves regressing conditional bank lending credit constraints from stage one on a measure of bank cost of funding for each country c and time period t similar to Rottmann & Wollmershäuser (2013). For the reasons explained in Section 4, in this paper, bank funding costs captured by bank deposit rates is the preferred measure contributing to a leftward shift in the credit supply curve. The ten year sovereign bond yield and bank CDS are also used in estimations for robustness tests as alternative measures of bank funding costs.

$$Stage\ 2 : \delta country\_time_{ct} = \gamma_{ct} + \lambda bank fundingcost_{ct} + u_{ct} \tag{2}$$

Finally, Rottman and Wollerhäuser's original two stage specification is extended to a third stage along the lines of Holton et al. (2013). The final stage of the model takes the residuals from the second stage as the dependent variable. The relationship between conditional credit constraints and macroeconomic and financial factors z for each country c and time period t forms the final stage of modelling.

$$Stage\ 3 : u_{ct} = \phi_{ct} + \sum_{l=1}^{L} \omega_l + z_{ct} + v_{ct} \tag{3}$$

All three stages of the model are estimated using ordinary least squares regression. Estimating the model across different stages has the advantage of decomposing the model between the fundamentals of the firm and the cost of bank funding. The coefficients of stage one and the stage two residuals may thus be used to identify a credit crunch conditional on the quality of firms and the bank cost of funding, respectively. The first stage also utilises the structure of the firm-level data while the second and third stage are estimated at the country level, reflecting the aggregation level of the data and avoiding issues with multicollinearity that comes with repeated country level observations in a firm level model, while also decomposing the estimation into the bank funding cost component and financial and economic conditions.

6 Results

Results from the first stage are found in Table 2. This stage of modelling focuses on the statistical association between the fundamental performance of the firm and credit constraints while accounting for sector and country-time effects. The dependent variable in both models is a measure of credit constraints at the firm level. In column 1, the dependent variable is measured at the broadest level to include partial credit rejections, self-rejections due to interest costs and discouraged borrowers. In column 2,

the dependent variable is more narrowly defined by excluding discouraged borrowers.

The findings from the modelling indicate that smaller firms — firms with less employment and also turnover — are more likely to be more credit constrained than larger medium sized firms. The smallest Micro firms are 11 per cent and 16 per cent more likely — in terms of employment and turnover respectively — to be credit constrained than the largest firms. For both employment and turnover size, the likelihood of being credit constrained decreases monotonically with increases in size. Subsidiaries of firms are also typically 5 per cent more likely to be credit constrained but the relationship is no longer statistically significant when discouraged borrowers are excluded in column 2. This may be due to increased complexity in subsidiaries corporate structure, making credit assessment more difficult, and increasing borrower discouragement. The results for the relationship between credit constraints and age are less clear with little evidence of statistical differences in credit constraints by age.

In terms of the performance of firms, positive or unchanged performance is associated with a lower likelihood of credit constraints. This holds across observed profitability, capital performance, or the credit history of the firm. Improving or unchanged credit history and own capital have the largest likelihood of reducing credit constraints with a likelihood of between 10 and 18 per cent while non-declining profitability has a lower likelihood of decreasing credit constraints (4-6 per cent). These results correspond to findings elsewhere in the literature on credit constraints and firm fundamentals (Holton et al. 2013 and Öztürk & Mrkaic 2014).

Variations of the baseline model 1 specification show the results to be robust.[4] Excluding discouraged borrowers reduces the fit of the modelling from an R-squared of 0.22 in model 1 to 0.16 in model 2, both of which are within the range of R-squared values found in previous research such as (Holton et al. 2013). The decrease in R-squared indicates the preferred broader measure of credit constraints is statistically a better fit for the data in addition to theoretical motivations for including the broader measure of credit constrained firms. The magnitude of the effect of hard information on the likelihood of being credit constrained is generally lower when discouraged firms are excluded suggesting that these factors have a relatively stronger effect on the likelihood of firms being discouraged. This suggests that discouragement is an efficient market outcome with discouraged firms more likely to be credit constrained as a result of firm

[4] An additional robustness test of excluding Greece from the sample is found to make little difference to the magnitude and statistical significance of the results in any of the modelling.

performance and characteristics (Han et al. 2009) and (Ferrando & Mulier 2015).

Table 2. Stage 1 estimation - firm-level fundamentals

	(1) Baseline	(2) Ex. Disc.
Micro	0.105***	0.0642***
	(8.81)	(5.64)
Small	0.0264**	0.0196**
	(3.03)	(2.60)
Turnover up to 2 million	0.159***	0.0559***
	(9.84)	(3.79)
Turnover over 2 to 10 million	0.0730***	0.0207
	(5.22)	(1.67)
Turnover over 10 up to 50 million	0.0223	0.00338
	(1.71)	(0.30)
Subsidary	0.0525***	0.0196
	(4.58)	(1.88)
10 years or more	-0.0443	-0.0880**
	(-1.39)	(-2.59)
5 years, up to 10 years	-0.00642	-0.0634
	(-0.19)	(-1.80)
2 years, up to 5 years	0.0750*	0.000180
	(2.15)	(0.00)
Profits improved	-0.0564***	-0.0362***
	(-6.59)	(-4.48)
Profits unchanged	-0.0563***	-0.0469***
	(-7.02)	(-6.11)
Credit history improved	-0.176***	-0.159***
	(-16.14)	(-13.88)
Credit history unchanged	-0.136***	-0.148***

	(-14.17)	(-13.89)
Own capital improved	-0.137***	-0.0933***
	(-12.19)	(-8.06)
Own capital unchanged	-0.121***	-0.0990***
	(-12.49)	(-9.29)
Constant	0.588***	0.400***
	(12.50)	(8.88)
Observations	29210	22995
R^2	0.216	0.156

t statistics in parentheses

Dependent variable is firm-level credit constraints.

Linear probability model estimated in ordinary least squares.

Sector and Country-time fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In the second stage of the modelling, credit constraints conditional on firm fundamentals is tested for its correlation with bank funding costs (see Table 3). The dependent variable in this stage of the modelling is the country-time dummy coefficient from the first stage of model. The coefficient reported in Table 3 from stage 2 model 1 indicates that a 1 per cent increase in the deposit rate is associated with a 7 per cent increase in credit constraints, conditional on firm fundamentals and relative to credit constraints in Germany in 2010 H2. The relationship is statistically significant as found in similar studies in the literature (Rottmann & Wollmershäuser 2013 and Holton et al. 2013). This relationship is found to be robust in both magnitude and statistical significance where discouraged borrowers (model 2) are excluded from the sample. Alternative indicators capturing bank funding costs through the risk free rate alternative (10 year bond yields in model 3) and bank financial stress (bank CDS rates in model 4) also find a statistically significant association with conditional credit constraints but at a lower magnitude at 2 per cent indicating a less elastic relationship. The statistical significance of bank funding costs also provides evidence of the functioning and relevance of monetary policy on firm credit constraints in the context of the OMT announcement by the ECB in 2012 as found in Ferrando et al. (2017).

Table 3. Stage 2 estimation - country-level bank cost of funding

	(1) Baseline	(2) Ex. Disc.	(3) Bond yield	(4) Bank CDS
Deposit rate	7.387***	6.726***		
	(5.38)	(6.55)		
Bond yield			2.277***	
			(7.22)	
Bank CDS				2.482***
				(9.28)
Constant	-0.195***	-0.0381	-0.129***	-0.121***
	(-6.58)	(-1.72)	(-8.09)	(-8.35)
Observations	165	165	165	150
R^2	0.151	0.208	0.242	0.368

t statistics in parentheses

Dependent variable is credit constraints conditional on firm fundamentals

Estimation in ordinary least squares

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 3. Credit crunch indicator - Deposit rates

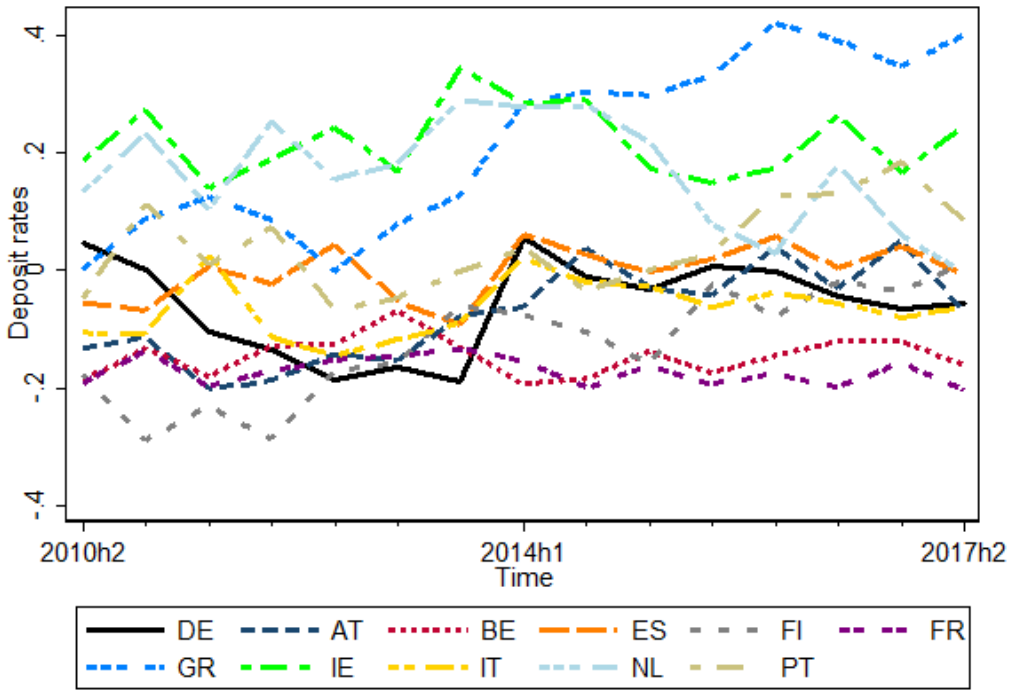


Figure 4. Credit crunch indicator - Bond yields

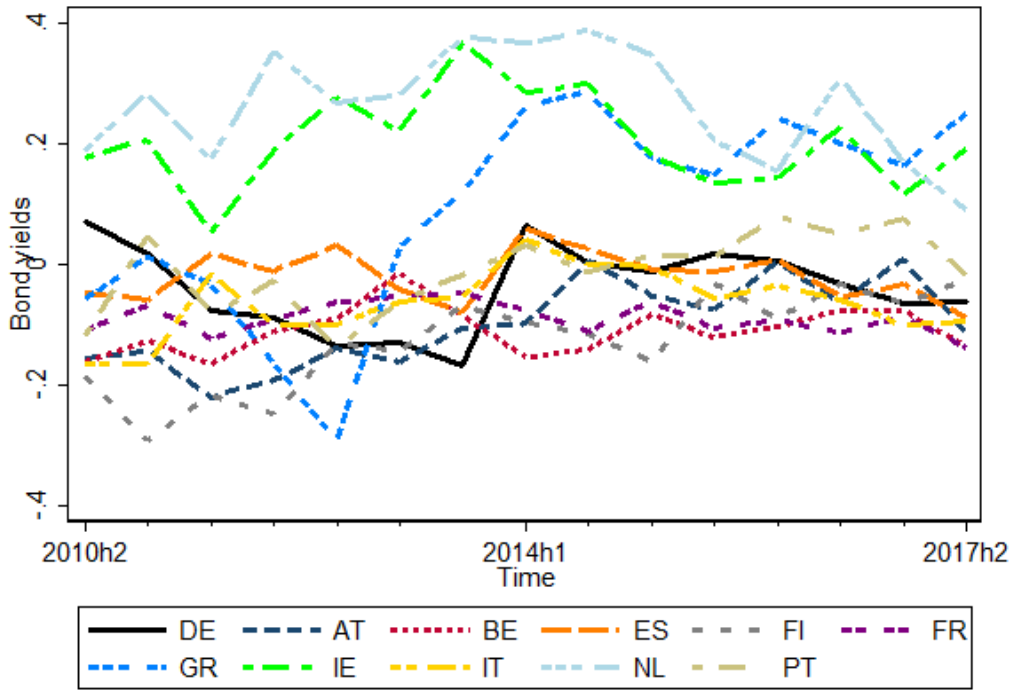
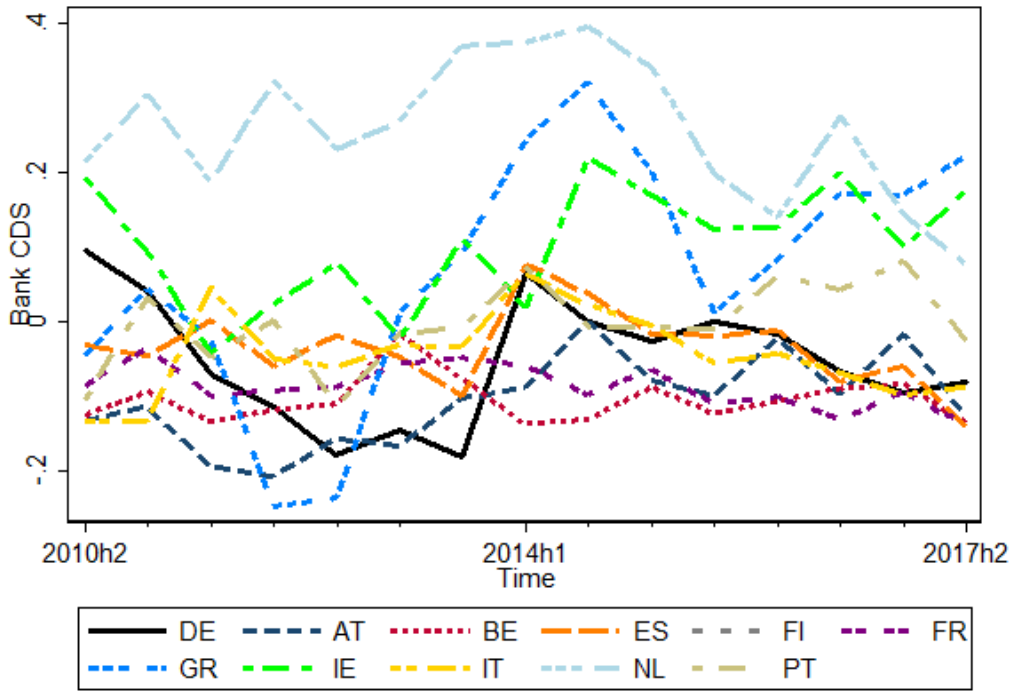


Figure 5. Credit crunch indicator - Bank CDS



Figures 3-5 illustrate the residuals from stage 2 for each country. The residuals represent credit constraints conditional on the fundamentals of firms in each country relative to Germany in 2010 H2 and the cost of bank funding (deposit rates, bond yields

and bank CDS). Thus, positive residuals represent a measure of a credit crunch suggested by Rottmann & Wollmershäuser (2013) and Holton et al. (2013). Using this measure, persistent credit crunches have occurred in Greece, Ireland and the Netherlands over the period 2010 H2 to 2017 H2.

In the final stage of the modelling, the residuals from stage two modelling of credit constraints – country-time variation that is orthogonal to firm fundamentals and bank funding costs (plotted in Figures 3-5) – become the dependent variable. This final stage of modelling considers various channels linked to conditional credit constraints. The key channels identified by the literature are all found to have statistically significant relationships with conditional credit constraints (Table 4). The signs of the channels are also as expected by the literature and theory. Economic conditions (Holton et al. 2013 and Jiménez et al. 2012), firm indebtedness (Blanco & Jiménez 2018, Jiménez et al. 2017, Öztürk & Mrkaic 2014, Holton et al. 2013 and Lawless et al. 2015), bank balance sheets (Jiménez et al. 2012) and bank lending margins (Carbo-Valverde et al. 2009) are all found to be positively linked to conditional credit constraints. The soft information channel is found to be negatively associated with conditional credit constraints as predicted by theory and the empirical literature (Liberti & Petersen 2018 and Beck et al. 2018). The finding of a negative relationship between SME credit constraints and the bank branch network at a time when banks are reducing the number of branches throughout the euro area suggests this development has not been coupled with more effective hardening of soft information to compensate for the reduction in the soft information channel.

The bivariate relationships between country-time residuals from stage 2 estimations and the financial and macroeconomic indicators are illustrated in Figures 6-10. The regression line provides a useful demarcation line between those countries where conditional credit constraints are higher than the euro area average (above the line) and those countries with lower conditional credit constraints (below the line). Credit constraints in these illustrations are orthogonal to the bank cost of funding, the fundamentals of the firms and the specific indicator being modelled. Among the countries identified as experiencing a persistent credit crunch in stage two, the credit crunch in the Netherlands would seem to be explained by bank lending margins and branches. Similarly, the unemployment rate, the share of non-performing loans on bank balance sheets and bank branches are associated with the credit crunch in Greece while lending margins and bank balance sheets are linked to the credit crunch in Ireland.

Table 4. Stage 3 estimation - bivariate country-level models

	(1)	(2)	(3)	(4)	(5)
NFC Credit to GDP	0.213***				
	(5.22)				
Unemployment rate		0.960***			
		(5.28)			
Non-performing loans			1.095***		
			(10.08)		
Lending margin				11.54***	
				(9.17)	
Bank Branches					-0.0367***
					(-6.10)
Constant	-0.188***	-0.108***	-0.0900***	-0.199***	0.150***
	(-4.98)	(-4.62)	(-6.46)	(-8.34)	(5.56)
Observations	165	165	154	165	165
R^2	0.143	0.146	0.401	0.341	0.186

t statistics in parentheses

Dependent variable is credit constraints conditional on firm fundamentals and bank cost of funding

Estimation in ordinary least squares

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 6. Stage 2 residuals plotted against bank branches per 10,000 people

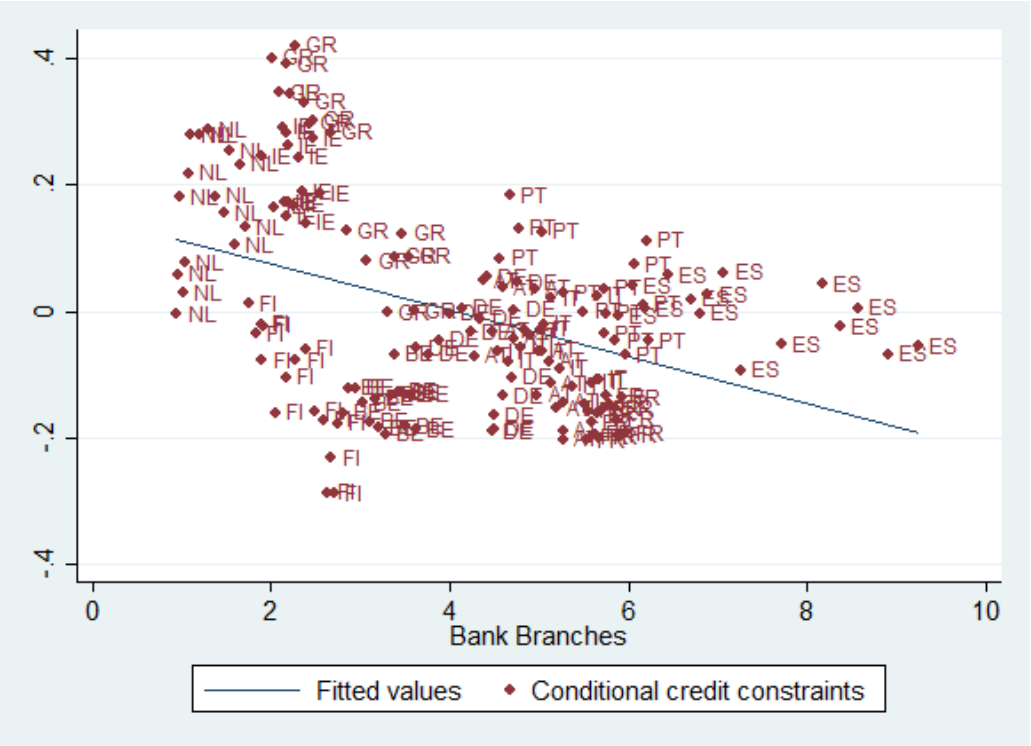


Figure 7. Stage 2 residuals plotted against NFC credit over GDP

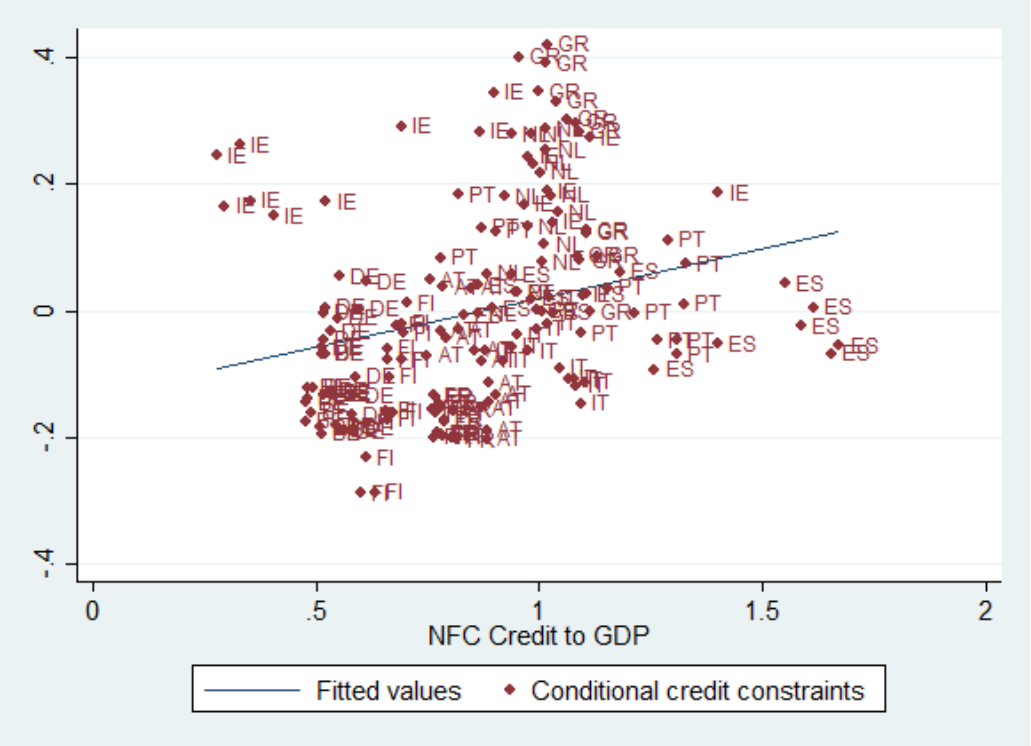


Figure 8. Stage 2 residuals plotted against share of non-performing loans

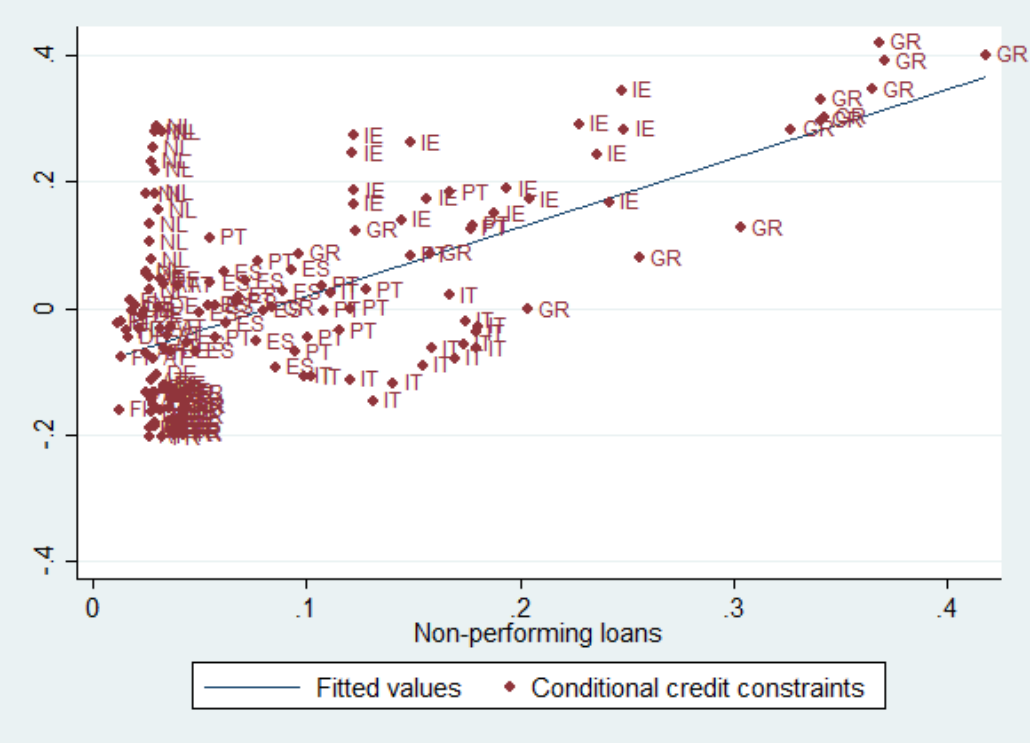


Figure 9. Stage 2 residuals plotted against bank lending margin

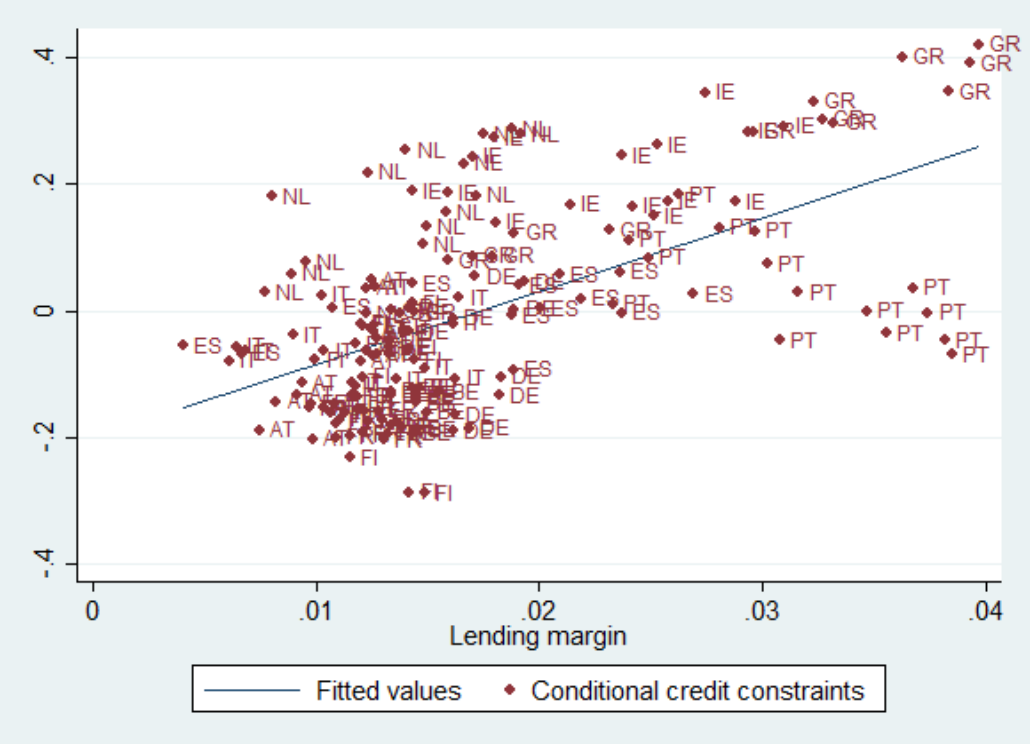
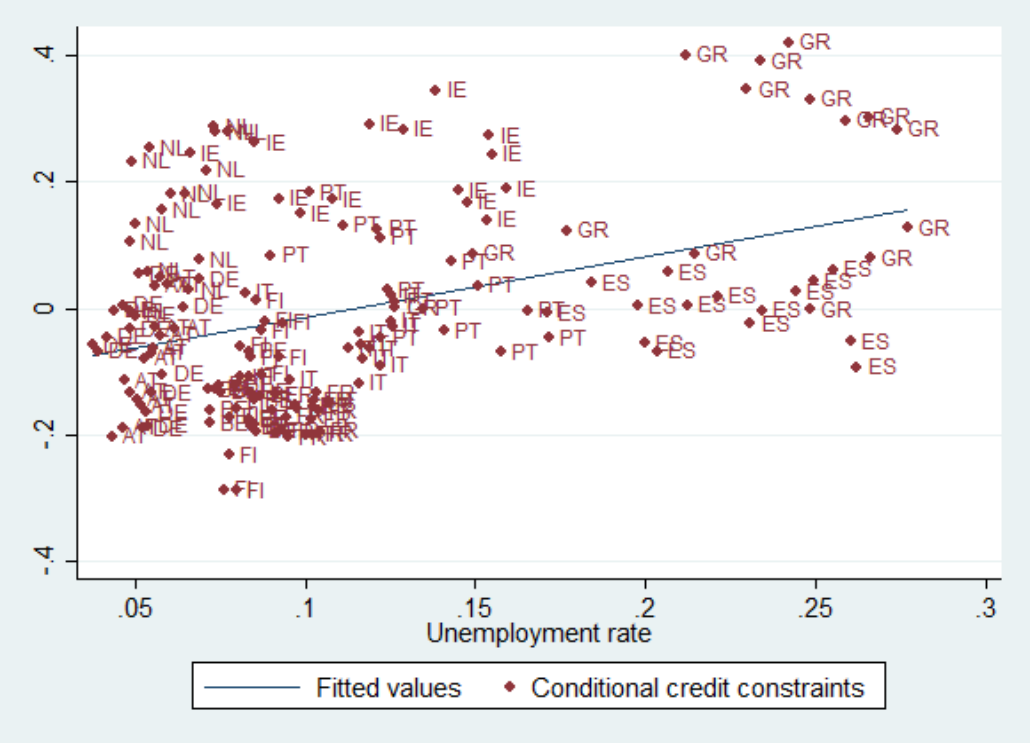


Figure 10. Stage 2 residuals plotted against the unemployment rate



Combining the various strands in a single multivariate model (Table 5) finds all channels other than the general measure of economic conditions (the unemployment rate) are statistically significant in column 1. General economic conditions are correlated with many of the co-variates, particularly firm and bank balance sheets, and so is subject to multicollinearity. Excluding economic conditions from the specification (column 2) makes little change to other model covariates and further specifications exclude this indicator to mitigate against multicollinearity. The specification is tested for robustness in the subsequent models. Removing discouraged borrowers in column 3 results in substantially smaller statistically significant magnitudes for the soft information channel and the bank competition channel, suggesting these channels — both of which are structural factors — have a disproportional impact on increasing borrower discouragement. This relationship is orthogonal to firm performance and characteristics suggesting structural factors such as declining soft information channels and competition result in greater credit constraints irrespective of the quality of firms (Kon & Storey 2003). For the soft information channel, the larger magnitude when discouraged borrowers are included suggests fewer bank branches increase discouragement among borrowers as the soft information channel is diminished. Similarly, the larger magnitude in the bank competition channel when discouraged borrowers are included suggests that more firms are discouraged from applying for credit when the lending market is less competitive. Adjusting the dependent variable to be orthogonal to bond yields as a measure of bank funding costs rather than deposit rates

finds similar results with the exception of bank balance sheets which loses statistical significance at any acceptable level. The health of bank balance sheets is theoretically already captured in both bond yields and bank CDS spreads (measures interpreted as bank financial stress, in addition to bank funding costs). During the financial crisis the health of bank balance sheets became linked to the health of sovereigns as markets expected banks to be bailed out by the state. As a result, bond yields capture the financial health of both the sovereign and the banking sector as well as bank funding costs. Similarly, bank CDS spreads capture both the bank funding costs and also the market perception of the health of bank balance sheets. When bank CDS spreads are used to proxy for bank funding costs, the sign on the bank balance sheet coefficient changes to a weakly statistically significant association with conditional credit constraints. This change in the sign on the bank balance sheet coefficient reflects that bank CDS spreads already capture the condition of bank balance sheets rather than a meaningful indicator of the relationship between bank balance sheets and SME credit constraints.

It is important to understand the relative importance of the factors influencing credit constraints in Europe. To this end, a measure of economic importance is presented. Economic importance is defined as the impact on credit constraints of a change in one standard deviation of the independent variable in Table 6.[5] Using this standardised measure, the economic importance of each of the independent variables can be assessed relative to one another. The soft information channel emerges as having the most economically meaningful impact on conditional credit constraints with a one standard deviation change in bank branches resulting in range of -0.5 to -0.7 of the standard deviations in credit constraints. Of similarly large economic importance is the condition of firm balance sheets and bank competition. The bank balance sheet channel has the lowest economic importance with a one standard deviation resulting in between a 0.19 and 0.2 of the standard deviations in credit conditions between model specifications. Understanding the economic importance of the channels is necessary in its own right to put each channel linked to credit constraints in context but also for policy prioritisation. The findings above provide evidence to suggest where policy makers can have the largest impact on credit constraints for SMEs.

[5] To calculate the economic importance all variables are standardised to have a mean of zero and a standard deviation of one before estimating the regression coefficients.

Table 5. Stage 3 estimation - multivariate country-level models

	(1) Inc. unemp.	(2) Baseline	(3) Ex. Disc.	(4) Bond yield	(5) Bank CDS
Bank Branches	-0.0472***	-0.0473***	-0.0287***	-0.0540***	-0.0510***
	(-11.07)	(-12.07)	(-7.56)	(-11.67)	(-10.82)
NFC Credit to GDP	0.220***	0.219***	0.184***	0.224***	0.197***
	(7.22)	(8.04)	(6.98)	(6.96)	(6.27)
Non-performing loans	0.328**	0.325**	0.277**	-0.0222	-0.244*
	(2.75)	(3.24)	(2.85)	(-0.19)	(-2.08)
Lending margin	6.295***	6.287***	3.129**	4.313***	4.414***
	(6.10)	(6.19)	(3.18)	(3.60)	(3.76)
Unemployment rate	-0.00843				
	(-0.05)				
Constant	-0.130***	-0.130***	-0.121***	-0.0400	-0.0165
	(-4.63)	(-4.80)	(-4.61)	(-1.26)	(-0.51)
Observations	154	154	154	154	148
R^2	0.737	0.737	0.572	0.589	0.532

t statistics in parentheses

Dependent variable is credit constraints conditional on firm fundamentals and bank cost of funding

Estimation in ordinary least squares

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6. Stage 3 estimation - multivariate country-level models - economic importance

	(1) Inc. unemp.	(2) Baseline	(3) Ex. Disc.	(4) Bond yield	(5) Bank CDS
Bank Branches	-0.567	-0.568	-0.453	-0.687	-0.699
NFC Credit to GDP	0.394	0.393	0.435	0.426	0.413
Non-performing loans	0.190	0.188	0.210	-0.014	-0.164
Lending margin	0.330	0.329	0.216	0.239	0.270
Unemployment rate	-0.003				

Standardized beta coefficients

Dependent variable is credit constraints conditional on firm fundamentals and bank cost of funding

Estimation in ordinary least squares

7 Conclusion and policy implications

Evidence is found for the fundamental factors associated with credit constraints at the firm level. As expected, firms in good financial health in terms of profitability, capital and credit history are less credit constrained whereas smaller firms, in terms of both employment and turnover, are found to be more credit constrained. The magnitude of the associations are lower when discouraged firms are excluded from the sample indicating that hard information has a stronger effect on discouragement than other forms of credit constraints.

The cost of bank funding is found to have a statistically significant association on access to finance conditional on the fundamentals of firm performance and characteristics. This underscores the effectiveness of monetary policy easing through OMT actions and the ECBs' firm commitment to take further action, if necessary. The evidence suggests credit supply may be affected by multiple channels even after controlling for firm fundamentals and the cost of bank financing. The most economically important factor is found to be the soft information channel. This underlines the policy challenge in the context of a declining bank branch network throughout Europe and in the absence of evidence to indicate soft information is being hardened to compensate. The condition of firm balance sheets, bank competition and bank balance sheets are also important. Furthermore, the channels influencing credit constraints may be conceptualised into two broad categories, legacy and structural factors. Legacy factors include firm and bank balance sheets. Structural factors include declines in banking branch networks and competition. Excluding discouraged borrowers from the sample reduces the magnitude and economic importance of key structural indicators (the bank branch network and competition) more than other indicators such as firm indebtedness and bank balance sheets. This suggests that while borrower discouragement is an efficient outcome linked to hard information, structural changes in the banking sector increase discouragement over and above firm performance and characteristics.

The factors impeding access to finance in the euro area outlined above present challenges for policy makers. For issues identified as legacies of the financial crisis, reforming resolution frameworks for excessively indebted firms and banks to deleverage is important to improve resiliency and financing conditions going forward. These issues are at least partially linked to the extent that overly indebted firms fail and the impact on bank balance sheets in the form of non-performing loans. For more structural problems, facilitating investment in soft information channels, either by existing market participants or new entrants, including cross-border entrants, would help to ease constraints on access to finance for SMEs. The findings show evidence tending

to support CMU actions to strengthen the soft information channel and competition through exempting local credit unions in all EU Member States from the scope of the EU's capital requirements rules for banks, while maintaining national safeguards proportional to the risks (European Commission 2015 and European Commission 2017). In addition, evidence is found to support secondary markets for non-performing loans to help restore bank balance sheets and convergence of insolvency proceedings to ensure the timely restructuring of balance sheets of viable firms. In light of the renewed effort by the European Commission to add urgency to reforms (European Commission 2018), the evidence informs policy-makers of areas of reform which will likely have the largest economic impact on SME access to finance; primarily the improvement of the soft information channel to mitigate a declining bank branch network and the resolution of highly indebted firms.

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Appendix

Table 7. Data definitions

Data Source	Variable	Definition
ECB/EC Survey on the access to finance of enterprises	Credit constrained	Binary variable recorded as: 0 = a firm applied for a bank loan (excluding overdraft and credit lines) and received more than 75 per cent of the loan. 1 = a firm was rejected for a bank loan OR a firm received less than 75 per cent of the amount of the requested loan OR a firm refused to proceed with the loan because of the cost OR a firm did not apply for a loan because of possible rejection. Excluding where the application is still pending OR Don't Know responses OR Not Applicable responses.
	Employment size classes	Micro; 1-9 employees, small; 10-49 employees and the reference group medium; 50-249 employees. Coded as one if a firm is within a given size class and zero otherwise. Excluding Don't Know OR Not Applicable responses.
	Turnover size bands	Turnover bands include; up to €2 million, €2- €10 million, €10- €50 million and the reference group; over €50 million. Coded as one if firm is within a given turnover band and zero otherwise. Excluding Don't Know OR Not Applicable responses.
	Age bands	Age bands include; more than 10 years, 5-10 years, 2-5 years, and the reference group; up to 2 years. Coded as one if firm is within a given age band and zero otherwise. Excluding Don't Know OR Not Applicable responses.

Data Source	Variable	Definition
ECB/EC Survey on the access to finance of enterprises	Ownership structure	Binary variable recorded as: 0 = an autonomous profit-oriented enterprise, making independent financial decisions (including partnerships and cooperatives) OR if questionnaire refers to before 2014 H1 an autonomous profit-oriented enterprise, making independent financial decisions, recorded as 1 = a subsidiary of another enterprise (a separate, distinct legal entity that is part of a profit-oriented enterprise) OR a branch of another enterprise (branches are controlled by a parent company and are not separate legal entities) OR if questionnaire refers to before 201 4H1, part of a profit-oriented enterprise (e.g. subsidiary or branch) not taking fully autonomous financial decisions. Excluding Don't Know OR Not Applicable responses.
	Profits improve OR unchanged OR decreased	Binary variable recorded as: 1 = firm reported profits (net income after taxes) increased/unchanged/decreased over the past 6 months, 0 = otherwise. Excluding Don't Know OR Not Applicable.
	Credit history improved OR unchanged OR deteriorated	Binary variable recorded as: 1 = firm reported credit history improved/unchanged/deteriorated over the past 6 months, 0 = otherwise. Excluding Don't Know OR Not Applicable.
	Own capital improved OR unchanged OR deteriorated	Binary variable recorded as: 1 = firm reported own capital (provided by the owners or shareholders) improved/unchanged/deteriorated over the past 6 months, 0 = otherwise. Excluding Don't Know OR Not Applicable.

Data Source	Variable	Definition
ECB Statistical Data Warehouse	Bank deposit rates	Deposit interest rates on outstanding deposits from households and non-financial corporations with agreed maturity (total) at Monetary financial institutions. Monthly data averaged over half years and expressed as decimals.
	Bond yield	Ten-year government bond interest rate for new issuance in Euros. Monthly data averaged over half years and expressed as decimals.
	Banking competition	Lending margins measured as the difference between Monetary Financial Institutions' interest rates for new business loans and a weighted average rate of new deposits from households and NFCs. Rates refer to loans granted to euro area residents. Monthly data averaged over half years and expressed as decimals.
ECB Statistical Data Warehouse, Eurostat, Central Statistics Office (Ireland)	Non-financial Corporation (NFC) Credit to GDP	Total outstanding loans to domestic non-financial corporations in Euros from the ECB SDW divided by GDP in Euros from Eurostat. Monthly loan data averaged over half years. Quarterly GDP data averaged over half years ending in March and September. For Ireland, quarterly modified total domestic demand data is used instead of GDP to account for the activities of large multinational enterprises not related to economic activity (a modified measure of GDP is not available at a quarterly frequency but total domestic demand is a close approximation). Data is expressed in decimals.
	Bank branches	Number of local units (branches) of domestic credit institutions at credit institutions per ten thousand of the population. Annual data at year-end, missing half year interpolated.

Data Source	Variable	Definition
IMF Financial Soundness Indicators	Non-performing loans	Quarterly non-performing loans as a share of total gross loans averaged over half years ending in March and September and expressed as decimals. Annual data used for Germany with missing half year interpolated.
Eurostat	Unemployment rate	Unemployment rate (share of active population), seasonally adjusted. The unemployment rate is the number of people unemployed expressed as a share of the labour force. The labour force is the total number of people employed and unemployed. Average of monthly unemployment rate data over half years ending in March and September and expressed as decimals.
Thompson Reuters Datastream	Bank Credit Default Swaps (CDS)	5-year bank, senior unsecured, modified-modified, CDS in euros. Average of daily bank CDS over half years ending in March and September. Median bank CDS selected from average of each bank CDS over full time period, lower bank CDS value selected if an odd number of banks exist.

Table 8. Mean values for key country-level variables

	Mean
Unemployment rate	
DE	0.051
AT	0.053
BE	0.080
ES	0.222
FI	0.084
FR	0.099
GR	0.228
IE	0.122
IT	0.110
NL	0.061
PT	0.132
NFC Credit to GDP	
DE	0.555
AT	0.838
BE	0.511
ES	1.237
FI	0.660
FR	0.781
GR	1.059
IE	0.993
IT	1.018
NL	0.975
PT	1.107
Observations	165

Sample 2010 H2 to 2017 H2. Countries include; Germany (DE), Austria (AT), Belgium (BE), Spain (ES), Finland (FI), France (FR), Greece (GR), Ireland (IE), Italy (IT), Netherlands (NL), Portugal (PT)

Table 9. Mean values for key country-level variables

	Mean
Lending margin	
DE	0.016
AT	0.011
BE	0.014
ES	0.017
FI	0.013
FR	0.012
GR	0.027
IE	0.023
IT	0.012
NL	0.014
PT	0.031
Bank Branches	
DE	4.308
AT	4.898
BE	3.246
ES	7.347
FI	2.267
FR	5.728
GR	2.777
IE	2.231
IT	5.181
NL	1.261
PT	5.566
Observations	165

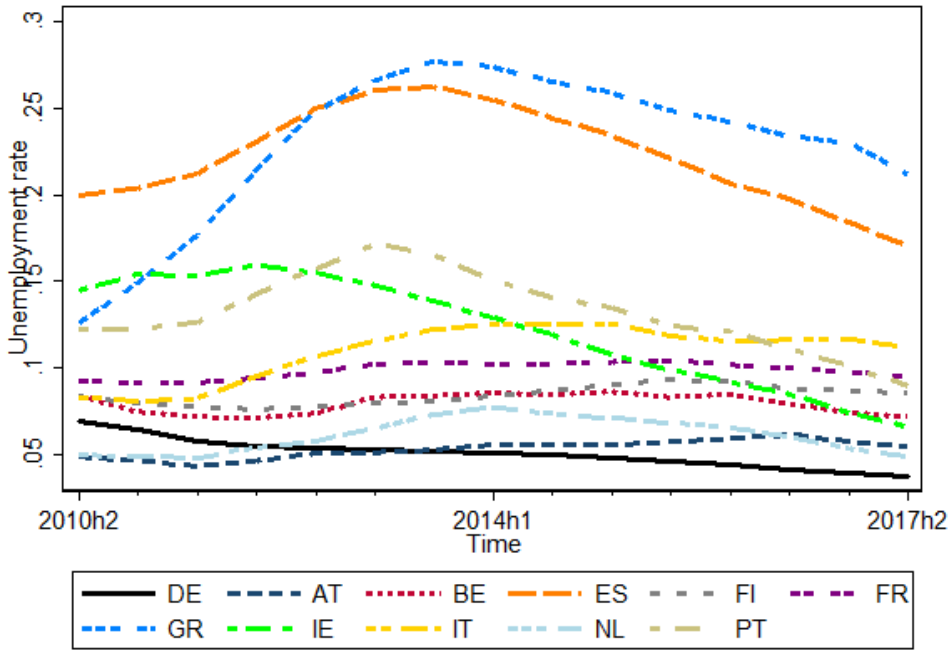
Sample 2010 H2 to 2017 H2. Countries include; Germany (DE), Austria (AT), Belgium (BE), Spain (ES), Finland (FI), France (FR), Greece (GR), Ireland (IE), Italy (IT), Netherlands (NL), Portugal (PT)

Table 10. Mean values for key country-level variables

	Mean
Non-performing loans	
DE	0.025
AT	0.030
BE	0.035
ES	0.066
FI	0.014
FR	0.041
GR	0.273
IE	0.182
IT	0.150
NL	0.028
PT	0.114
Observations	154

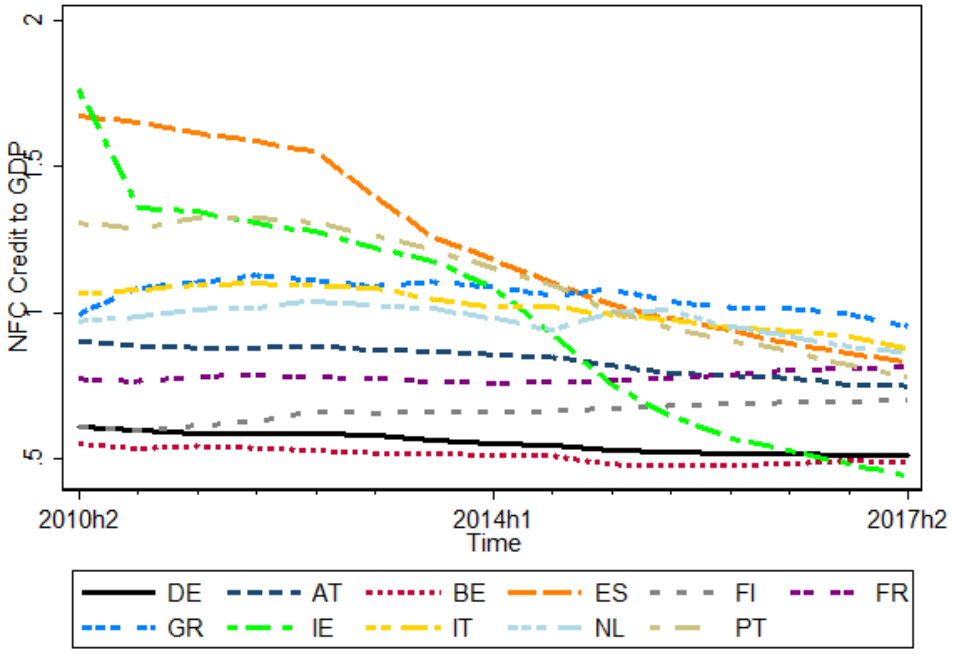
Sample 2010 H2 to 2017 H2. Countries include; Germany (DE), Austria (AT), Belgium (BE), Spain (ES), Finland (FI), France (FR), Greece (GR), Ireland (IE), Italy (IT), Netherlands (NL), Portugal (PT)

Figure 11. Unemployment rate by country



Source: Eurostat

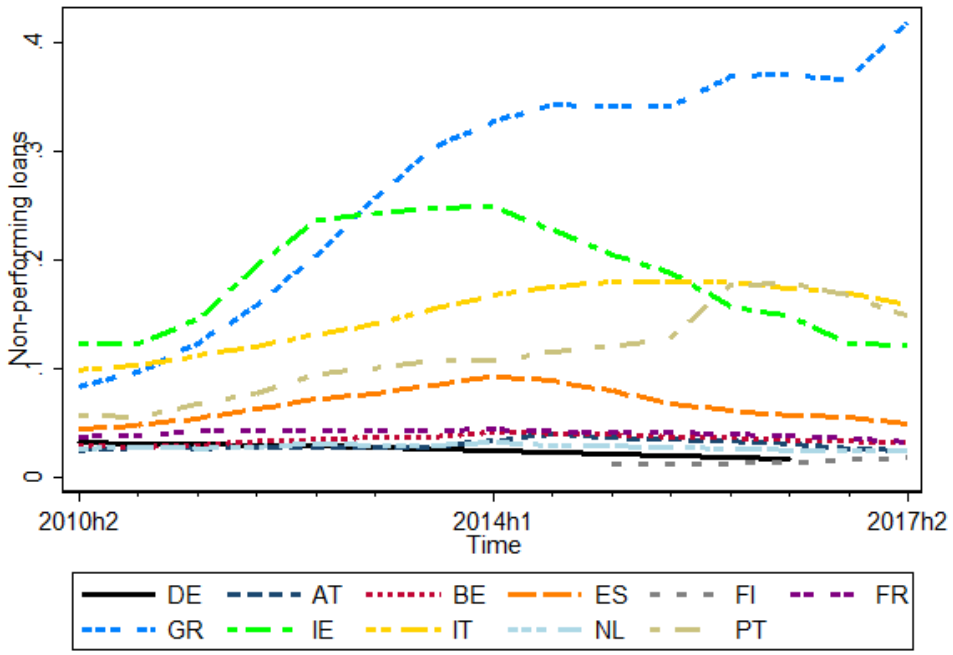
Figure 12. NFC debt to GDP ratio by country



Source: ECB/EC Statistical Warehouse, Eurostat and Central Statistics Office (Ireland)

Note: For Ireland, modified total domestic demand data is used instead of GDP

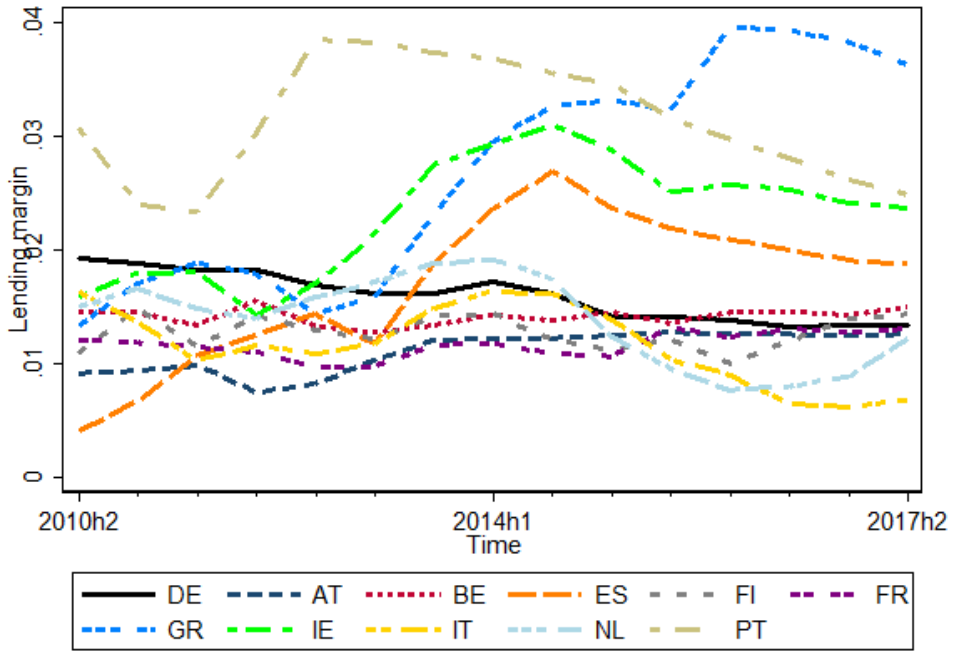
Figure 13. Share of non-performing loans on bank balance sheets by country



Source: IMF Financial Soundness Indicators

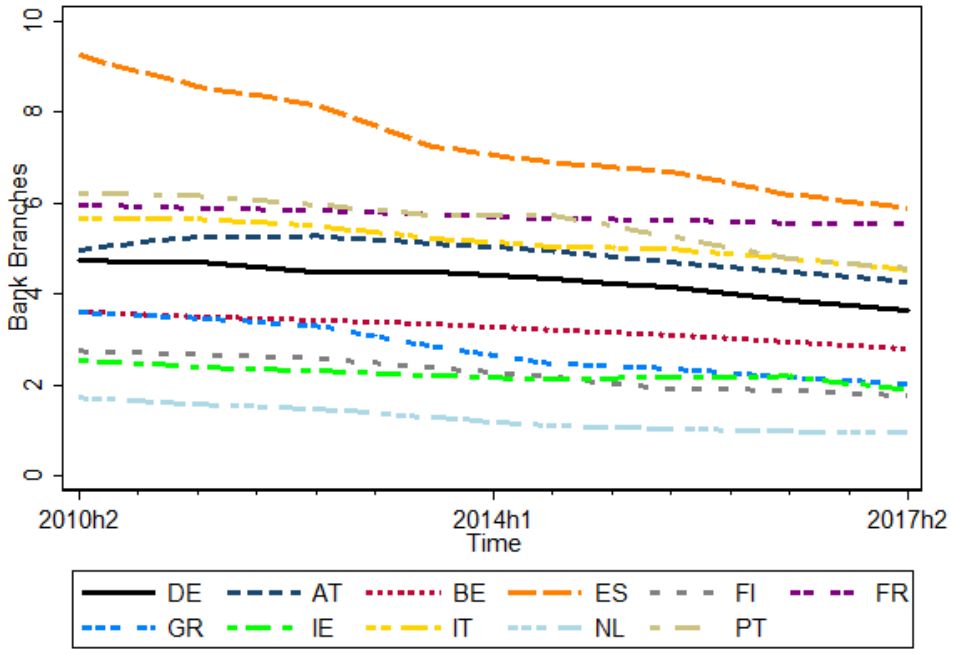
Note: Data unavailable for Finland in earlier periods and Germany in later periods

Figure 14. Bank lending margin by country



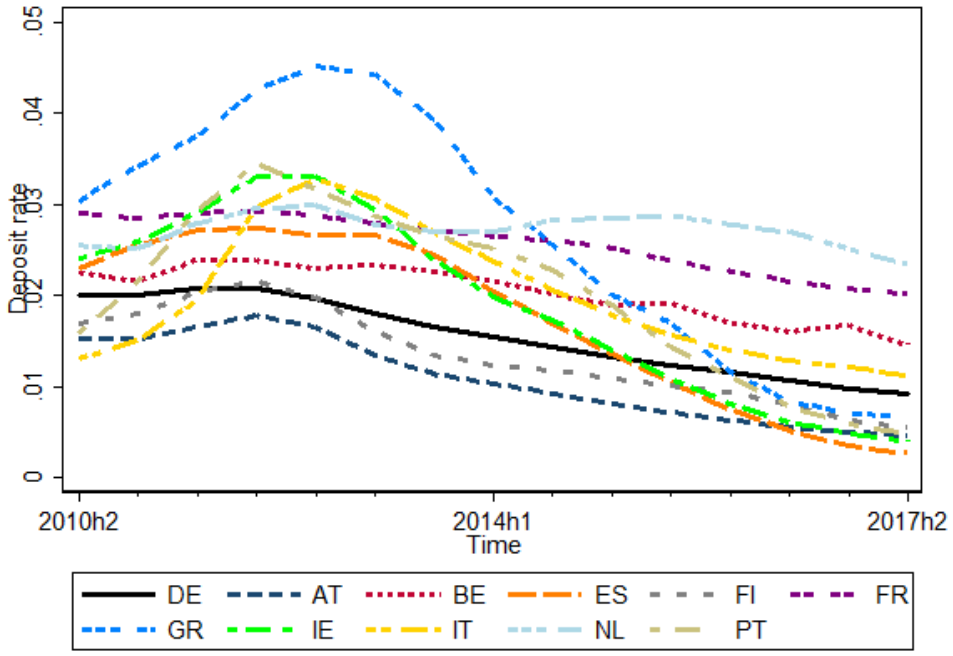
Source: ECB/EC Statistical Warehouse and Eurostat

Figure 15. Bank branches per 10,000 people by country



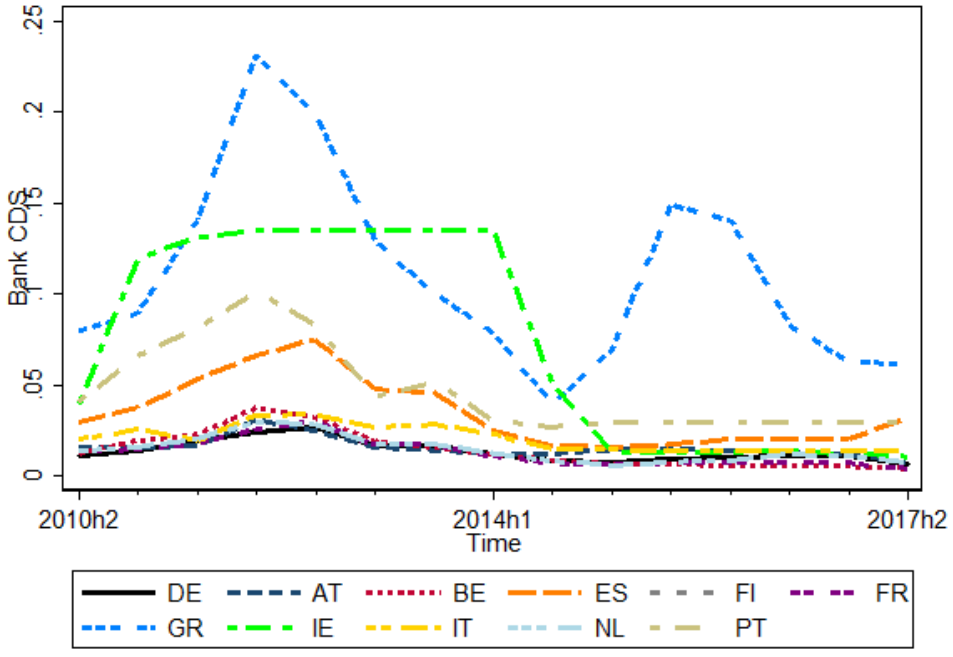
Source: ECB/EC Statistical Warehouse and Eurostat

Figure 16. Bank deposit rate by country



Source: ECB/EC Statistical Warehouse and Eurostat

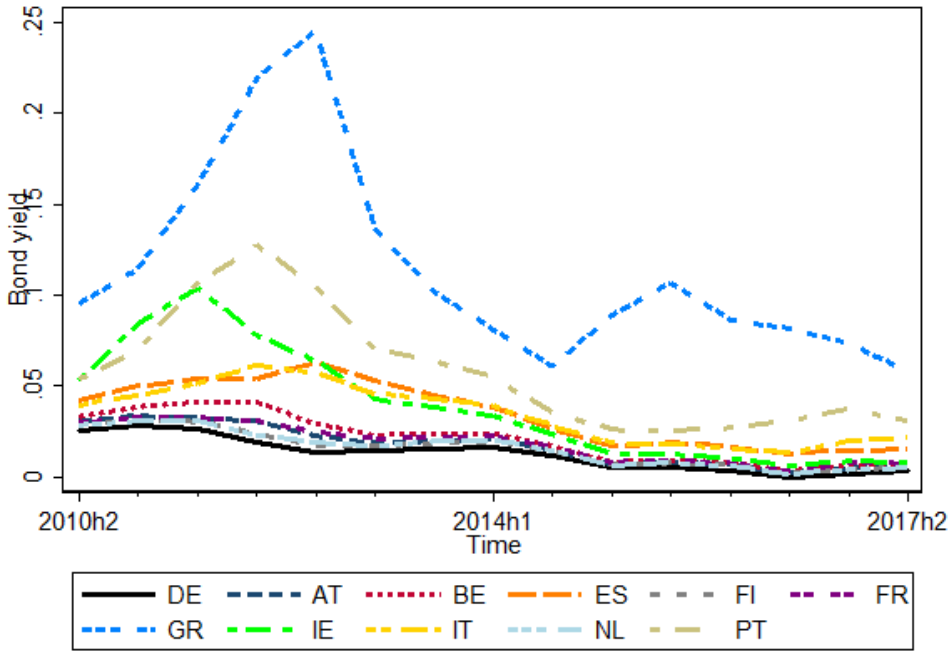
Figure 17. Bank CDS by country



Source: Thompson Reuters Datastream

Note: Data unavailable for Finland

Figure 18. Sovereign 10-year bond yields by country



Source: ECB/EC Statistical Warehouse and Eurostat

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