Understanding SME interest rate variation across Europe

James Carroll & Fergal McCann (FSD)

Abstract

The cost of credit for small and medium enterprises (SMEs) differs considerably across the EU. This research begins by exploiting firm-level survey data to test whether differences in the characteristics of borrowing SMEs can explain cross-country variation in the cost of credit on new lending in 2014 and 2015. We find that new overdraft interest rates across the EU are lower for larger and older firms, and for those experiencing recent improvements in trading performance. However, controlling for such characteristics does not, in general, explain much of the overall difference in interest rates across countries. We extend the analysis by examining whether cross-country interest rate variation is associated with differences in the following key factors: banking sector cost efficiency; institutional factors relating to recoverability of collateral; existing and predicted default rates on SME lending; competition in the banking sector; banking sector risk and cost of funds; general macroeconomic performance. Using simple univariate correlations, we observe a significant positive relationship between interest rates and past/predicted SME loan defaults, and a negative relationship with the level of bank competition. Interest rates are also higher where banking stress is high and where unemployment is above historical levels. We find no correlation with banking sector profit/cost ratios, the cost of funds, or the efficiency of the insolvency system.

Introduction

There is considerable cross-country heterogeneity in the cost of credit for Small and Medium-sized enterprises (SMEs) in Europe. The ECB's *Monetary and Financial Statistics* (European Central Bank, 2016a) show that non-financial corporation (NFC) interest rates on loans up to €250,000 in 2015 range from 2.2 per cent in Austria to 5.8 in Ireland (Figure 1). Recent research (Holton and McCann, 2016) also shows that the interest rate differential between stressed and non-stressed economies[1] has grown considerably since the onset of the crisis, and that the variation in interest rates charged by banks within these two groups of countries has also increased considerably. Such large differentials are a potential source of concern for policymakers, in that high SME rates in some countries may reduce credit demand and increase debt service burdens for firms, with knock-on effects for investment, profitability and growth. Further, in the case of euro area countries, significant differences in the cost of borrowing for similar firms suggest the possibility of a breakdown in the smooth transmission of monetary policy to the real economy, which has been uncovered in a large literature using both micro-level and aggregate data since the onset of the crisis.[2]

The aims of this research are twofold. We begin by testing whether cross-country differences in SME interest rates can be explained by compositional differences in the underlying population of borrowing firms. It would be expected from a prudential perspective, for example, that a country with a larger share of ex-ante riskier borrowers (perhaps smaller firms, or those with poorer trends in sales and profits) should experience higher borrowing costs. The variation in a country's interest rate that is not explained by the composition of borrowing firms is denoted the Residual Interest Rate (RIR).

Using EU survey data from twenty countries, we estimate the RIR for SME overdraft facilities. We find a number of firm characteristics which

Figure 1: Mean Monthly Interest Rate on SME loans in 2015

Mean interest rate 2015
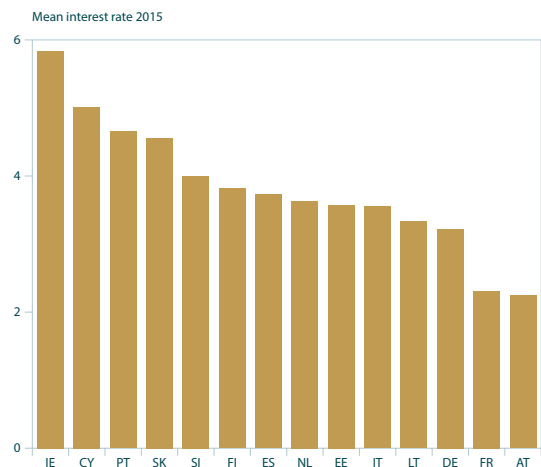
Source: ECB Monetary and Financial Statistics.

Note: Data are for new business lending to non-financial corporatic loans on values up to and including €250,000 (our proxy for SME interest rates). New business is defined as any new agreement between a household or a non-financial corporation and a bank. New agreements comprise all financial contracts, the terms and conditions of which specify, for the first time, the interest rate on a deposit or loan, as well as all new negotiation of existing deposits and loans. The data cover the period from January to November 2015.

affect bank interest rate decisions. Similar to previous research on credit constraints (Holton et al. 2013, Holton et al. 2014), we observe a significant size effect, with larger firms, in terms of employees and turnover, being changed less. We also find that rates are lower for older firms, firms that experienced recent turnover increases, and firms that borrowed to invest. Using Ireland as a reference country, the RIR is significantly higher only in Greece, similar to Bulgaria, Romania and Germany, and lower in the remaining fifteen Member States. Importantly, we find that controlling for these firm-level characteristics does not reduce country-level interest rate heterogeneity – the rank ordering of countries' interest rates before and after the inclusion of firm-level controls is close to unchanged. In short, differences in underlying SME populations across Member States do not appear to be driving overall differences in country-level interest rates.

---

1   The term "stressed countries" refers in the cited study to Greece, Ireland, Italy, Spain, Portugal and Cyprus. Meanwhile "non-stressed countries" refers to Austria, Belgium, France, Germany, Finland, Netherlands.

2   See Holton and Rodriguez (2015) for a more detailed treatment and discussion of the transmission of monetary policy during the crisis.

Having ascertained that firm-level variation plays little to no role in explaining aggregate interest rate variation (in the data available to us), we then provide a descriptive analysis of the association between SME interest rates and a range of country-level factors. We group these factors into six key groups: banking sector cost efficiency; institutional factors relating to recoverability of collateral; existing and predicted default rates on SME lending; competition in the banking sector; banking sector risk and cost of funds; general macroeconomic performance.

In line with what would be expected when viewing loan pricing from a prudential perspective, we find a strong positive relationship between SME interest rates and both the share of SME loans in default at end-2013 and the predicted flow of corporate loans into default from 2014 to 2016 (both measured using European Banking Authority stress testing data). We also show that the "unemployment gap", measured as the ratio of 2015 unemployment to the pre-crisis average, is also positively associated with the SME interest rate, suggesting a role for aggregate economic weakness in the story.

We also find that aggregate proxies for banking sector stress (the average Credit Default Swap of listed banks and the ten-year sovereign yield) are associated with higher interest rates. This pattern is in line with a large literature on the "bank lending channel", which suggests that supply-side weaknesses in banks' balance sheets impair the transmission of monetary policy to the real economy, and in particular to smaller, more bank-dependent firms.[3]

Outside of the role of bank and borrower risk, we also highlight a strong correlation between interest rates and weak competition in the banking sector. A similar relationship has been shown using bank-level data by Holton and McCann (2016) and for SME credit constraints by Carbo-Valverde et al. (2009) and Ryan et al. (2014). This finding provides further support to the bank market power hypothesis put forward in the aforementioned literature, whereby borrowing firms experience worse outcomes under weak banking competition.

Finally, we find that neither measures of the cost efficiency of the banking sector (cost-to-income ratio and profit-to-asset ratios) or of the recoverability of collateral (as measured by the World Bank's *Doing Business* database) have any meaningful relationship with the cost of SME borrowing across the euro area.

The data available to us do not allow for a rigorous econometric testing of the conditional role of the above-mentioned factors in explaining interest rate differentials, nor does it allow us to identify a "silver bullet" causal factor. Similarly, the measurement of an "optimal" or "expected" interest rate for SME lending given economic and banking fundamentals is beyond the scope of this study. Nonetheless, the patterns identified are consistent with findings in existing economic literature using both bank-level and firm-level data, consistent with theoretical priors (e.g. risk-based pricing, the bank lending channel, bank market power), and can provide important insights to those aiming to understand the forces at play in explaining the cost of credit for SMEs and the way in which this cost can deviate in particular countries.

Firm Level Interest Rate Model – Methods and Data

Using standard Ordinary Least Squares and firm-level data, we regress SME interest rates upon a range of firm characteristics – size, age, performance, for example. We then add country-level fixed effects to pick up any remaining cross-country variation, which we call the *Residual Interest Rate* (RIR). These effects can be interpreted as the interest rate premium which remains after cross-country differences in firm characteristics are controlled for. A similar approach is adopted by Rottman and Wollmershauser (2013) and Holton et al. (2013), who focus on SME credit constraints.

We estimate this model using data from the *Survey on the Access to Finance of Enterprises* (SAFE). The survey has been carried out every six months since September 2009 by the European Commission and the European

---

3   For example, Bernanke and Gertler (1995), Mishkin (1995), Santos (2011), Holton and McCann (2016).

Table 1: SAFE Sample Sizes

Country	SAFE Total Sample	Number of Overdraft Applications	Number Providing Interest Rate
Austria (AT)	1,656	300	202
Belgium (BE)	1,643	223	131
Bulgaria (BG)	922	163	96
Czech Republic (CZ)	893	134	67
Germany (DE)	3,794	454	307
Denmark (DK)	885	107	73
Spain (ES)	3,795	880	593
Finland (FI)	1,349	136	61
France (FR)	3,943	832	387
Greece (GR)	1,733	140	66
Hungary (HU)	904	172	69
Ireland (IE)	1,384	242	120
Italy (IT)	4,236	1,061	571
Netherlands (NL)	2,374	212	88
Poland (PL)	2,387	512	237
Portugal (PT)	1,716	350	179
Romania (RO)	883	212	69
Sweden (SE)	872	71	37
Slovakia (SK)	1,352	259	128
United Kingdom (UK)	2,212	269	122
Total	**38,933**	**6,729**	**3,603**

Source: Own calculations using ECB/EC SAFE survey.

Note: Based on latest three surveys (ending September 2014, March 2015 and September 2015). Bulgaria, Czech Republic, Denmark, Hungary, Poland, Romania, Sweden and the United Kingdom are not surveyed in March 2015.

Central Bank (European Central Bank, 2016b).[4] We focus our analysis on countries with at least 500 observations per wave and we also remove large firms (more than 250 employees), leaving a sample of SMEs for twenty EU countries.

The survey has collected interest rate data on new overdraft facilities in the latest three survey waves (ending September 2014, March 2015 and September 2015). Table 1 presents the number of firms who reported their interest rate (our empirical sample) and Figure 2 presents the mean interest rate by country. We note that a caveat to our analysis is the limited number of observations in some countries – nine of the twenty countries in our regression sample have

less than one hundred observations for the latest three waves. As with Figure 1, Figure 2 shows significant differences across countries, with rates of over 6 per cent in Greece, Bulgaria and Romania and below 4 per cent in Belgium, Austria and Finland.

Our choice of independent variables is motivated by a range of prior research on interest rate setting for enterprise lending. Petersen and Rajan (1994), Harhoff and Körting (1998), Hernández-Cánovas and Martínez-Solano (2010) and Gambacorta and Mistrulli (2014) find that larger firms are charged lower rates.[5] To measure firm size, we include firm turnover – captured by six categorical variables – and employee numbers

4   The ECB wave is carried out every six months and is comprised of Austria, Belgium, Germany, Spain, Finland, France, Greece, Ireland, Italy, Netherlands, Portugal and Slovakia. A more comprehensive survey is carried out every second wave by the EC which includes all EU countries.

5   The dependent variable in Gambacorta and Mistrulli (2014), is the change in interest rates pre- and post-crisis. Berger and Udell (1995) and Degryse and Van Cayseele (2000) find no significant size effects.

Figure 2: Mean Interest Rates on SME Overdraft Facilities
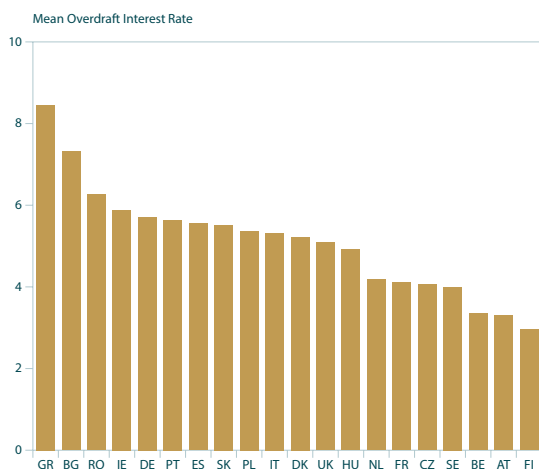
Mean Overdraft Interest Rate

Source: Own calculations using ECB/EC SAFE survey.

Note: Based on latest three surveys (ending September 2014, March 2015 and September 2015). Survey weights employed in calculation.

– captured by three categorical variables for 'Micro' (0-9 employees), 'Small' (10-49) and 'Medium' SMEs (50-249). Firm age is shown to have a negative effect on interest rates in Petersen and Rajan (1994), Harhoff and Körting (1998), Degryse and Van Cayseele (2000) and Hernández-Cánovas and Martínez-Solano (2010). For this, we include three categorical variables for firms aged 0-4 years, 5-9 years and 10+ years.

Previous research also highlights the importance of firm trading performance. For example, Harhoff and Körting (1998) find that financial distress leads to higher rates. Similarly, Petersen and Rajan (1994) find that firms with higher sales growth are charged less. To account for such factors, we include categorical variables for firms that experienced increased, decreased and unchanged turnover in the previous six months (continuous turnover information is not available). We also control for firms that borrowed for fixed investment (property, plant, machinery or equipment) and consider this to be an additional proxy for improved trading performance. Finally,

we account for ownership structure by including a dummy variable for SMEs who are a subsidiary or branch of a larger entity. We expect that such firms, given their ties with large and relatively more stable organisations, are considered lower risk by banks. While it is possible that some of the firm-level relationships may be expected to have varying coefficient estimates across countries, for the purposes of the current study we impose that these relationships are common across all sample countries.

Summary statistics for all variables employed are presented in Table 2. The average overdraft interest rate in the data is 4.9 per cent. Firms are relatively evenly split across the categories of turnover between zero and €50 million, with those with a turnover above €50m accounting for just 4.9 per cent of the 3,603 firms in the data set. In terms of employment size, firms are again relatively evenly split between Micro, Small and Medium enterprises. The majority of firms (81.8 per cent) are in existence for more than ten years. Turnover growth (45.6 per cent) is more prevalent than either unchanged or declining turnover in the six months preceding the survey round. The purpose of the project for which the firm has applied for financing is reported to be "fixed investment" in 38.2 per cent of cases. Subsidiaries of larger corporate groups are relatively rare in the data, at 9.7 per cent of the total.

Results

Table 3 presents results from this interest rate model across the twenty EU countries.[6] Country coefficients are presented with and without firm characteristics in Model 1 and Model 2 respectively. The majority of firm characteristics are statistically significant and of the expected sign. Firm size is an important determinant of interest rates, with larger firms, in terms of both turnover levels and employee numbers, being charged less. For example, the interest rate of firms with turnover above €10 million is over 2.5 percentage points (PPs) lower than the reference group (less than €0.5 million). The magnitude of these differences

---

6   The regression sample size differs slightly to Table 1 as a small number of firms were missing information on turnover and age.

Table 2: Summary Statistics – Regression Sample		
Variable	**Mean**	**Standard Deviation**
Overdraft Rate	4.910	3.848
Turnover: <0.5M	0.190	-
Turnover: >=0.5M & <1M	0.119	-
Turnover: >=1M & <2M	0.129	-
Turnover: >=2M & <10M	0.295	-
Turnover: >=10M & <50M	0.218	-
Turnover: >=50M	0.049	-
Employees: Micro (<10)	0.287	-
Employees: Small (>=10 & <50)	0.338	-
Employees: Medium (>=50 <250)	0.375	-
Sector: Industry	0.318	-
Sector: Construction	0.108	-
Sector: Trade	0.287	-
Sector: Services	0.286	-
Age: <5	0.053	-
Age: >=5 & <10	0.129	-
Age: >=10	0.818	-
Turnover Unchanged	0.295	-
Turnover Increased	0.456	-
Turnover Decreased	0.249	-
Fixed investment	0.382	-
Subsidiary	0.097	-
September 2014	0.362	-
March 2015	0.286	-
September 2015	0.352	-

Source: Own calculations using ECB/EC SAFE survey.

Note: Based on latest three surveys (ending September 2014, March 2015 and September 2015) for SMEs who reported their overdraft interest rate.

is large relative to the mean (4.91 per cent). Furthermore, rates of Medium and Small firms are 0.66 PPs and 0.4 PPs lower than Micro. In line with previous research, an age effect is apparent – while there is no difference between the youngest two categories, firms in the oldest group (ten years and older) have significantly lower interest rates (0.78 PPs). This age effect may be driven by increased bank-borrower relationship strength (length) or by the stronger reputation and financial track record generally held by older firms.

The financial performance of firms also matters in interest rate decisions. Compared to firms with unchanged turnover, firms that experience increased turnover in the previous six months are charged 0.37 PPs less, while firms with decreased turnover are charged 0.31 PPs more. Similarly, firms that borrowed to invest, which we consider to be a proxy for strong financial performance, are charged 0.69 PPs less. Finally, we observe that overdraft interest rates have been declining across the EU – compared to September 2014, interest rates in March 2015 and September 2015 are 0.81 PPs and 1.09 PPs lower. This decline is consistent with trends in NFC loan interest rates for this period (Central Bank of Ireland, 2016), and is consistent with the unconventional monetary expansion engaged in by the European Central Bank during the period.

Table 3: OLS Regression Results

	Model 1		Model 2	
	Coefficient	Robust Standard Error	Coefficient	Robust Standard Error
RIR: AT	-2.696***	0.295	-2.563***	0.289
RIR: BE	-2.763***	0.407	-2.442***	0.393
RIR: BG	1.215**	0.596	0.465	0.563
RIR: CZ	-2.040***	0.425	-2.101***	0.398
RIR: DE	-0.271	0.35	0.016	0.332
RIR: DK	-0.869*	0.449	-0.722*	0.393
RIR: ES	-0.568*	0.326	-0.961***	0.302
RIR: FI	-2.873***	0.385	-2.564***	0.401
RIR: FR	-2.172***	0.344	-2.267***	0.325
RIR: GR	2.349***	0.426	1.696***	0.402
RIR: HU	-1.086*	0.591	-1.494**	0.587
RIR: IE	-----------------------------Reference Category -------------------------			
RIR: IT	-0.746**	0.302	-1.133***	0.284
RIR: NL	-1.821***	0.332	-1.170***	0.316
RIR: PL	-0.682**	0.338	-0.946***	0.302
RIR: PT	-0.700*	0.381	-0.885**	0.358
RIR: RO	0.326	0.543	0.026	0.535
RIR: SE	-1.895***	0.439	-1.613***	0.43
RIR: SK	-0.717	0.444	-1.100***	0.409
RIR: UK	-0.865*	0.504	-1.003**	0.472
Turnover: <0.5M	-----------------------------Reference Category -------------------------			
Turnover: >=0.5M & <1M			-0.396	0.27
Turnover: >=1M & <2M			-1.242***	0.243
Turnover: >=2M & <10M			-2.148***	0.238
Turnover: >=10M & <50M			-2.531***	0.28
Turnover: >=50M			-2.849***	0.401
Employees: Micro (<10)	-----------------------------Reference Category -------------------------			
Employees: Small (>=10 & <50)			-0.404**	0.187
Employees: Medium (>=50 & <250)			-0.660***	0.24
Sector: Industry	-----------------------------Reference Category -------------------------			
Sector: Construction			0.219	0.199
Sector: Trade			0.128	0.151
Sector: Services			0.268*	0.162
Age: <5	-----------------------------Reference Category -------------------------			
Age: >=5 & <10			-0.361	0.371
Age: >=10			-0.780**	0.338
Turnover Unchanged	-----------------------------Reference Category -------------------------			
Turnover Increased			-0.305**	0.132
Turnover Decreased			0.374**	0.178
Fixed investment			-0.691***	0.113
Subsidiary			-0.249	0.184
September 2014	-----------------------------Reference Category -------------------------			
March 2015			-0.810***	0.152
September 2015			-1.085***	0.137
Constant	5.870***	0.268	9.440***	0.489
Observations	3577		3577	
R-Squared	0.070		0.229	

Source: Own calculations using ECB/EC SAFE survey.

Note: Statistical significance indicated by '***' (10%), '**' (5%) and '*' (1%). 'RIR' indicates Residual Interest Rate.

Country	Model 1 RIR	Model 1 Rank	Model 2 RIR	Model 2 Rank	RIR Difference	Rank Difference
FI	-2.873***	1	-2.564***	1	-0.310	0
BE	-2.763***	2	-2.442***	3	-0.322	1
AT	-2.696***	3	-2.563***	2	-0.133	1
FR	-2.172***	4	-2.267***	4	0.095	0
CZ	-2.040***	5	-2.101***	5	0.062	0
SE	-1.895***	6	-1.613***	6	-0.282	0
NL	-1.821***	7	-1.170***	8	-0.651***	1
HU	-1.086*	8	-1.494**	7	0.408*	1
DK	-0.869*	9	-0.722*	15	-0.147	6
UK	-0.865*	10	-1.003**	11	0.138	1
IT	-0.746**	11	-1.133***	9	0.387**	2
SK	-0.717	12	-1.100***	10	0.382*	2
PT	-0.700*	13	-0.885**	14	0.185	1
PL	-0.682**	14	-0.946***	13	0.263	1
ES	-0.568*	15	-0.961***	12	0.393**	3
DE	-0.271	16	0.016	17	-0.287*	1
IE	0	17	0	16	0.000	1
RO	0.326	18	0.026	18	0.300	0
BG	1.215**	19	0.465	19	0.750***	0
GR	2.349***	20	1.696***	20	0.654***	0
Mean	**-0.944**		**-1.038**		**0.094**	**1.158**

Table 4: Residual Interest Rate Comparison

Source: Own calculations using results from Table 3.

Note: Statistical significance indicated by '***' (10%), '**' (5%) and '*' (1%). 'RIR' indicates Residual Interest Rate. Statistical significance of RIR difference between Model 1 and Model 2 refers to a Wald test (Ho: RIR Model 1 – RIR Model 2 = 0) following the 'suest' command in STATA.

The RIR estimates show the country-specific interest rate premium relative to the reference category (Ireland). While four countries – Bulgaria, Germany, Romania and Greece – have higher RIRs, only Greece is statistically significant (1.7 PPs higher). The remaining countries all have lower RIRs. At the lower end are Austria, Belgium, Czech Republic, Finland and France, whose RIRs are all over 2 PPs lower than Ireland.

Table 4 compares the RIR estimates from Model 1 (no firm characteristics) to Model 2.[7] Overall, the mean RIR from Model 2 (-1.04) is very similar to Model 1 (-0.94), and for most countries, the RIR between models is not statistically different. There are exceptions – for example, for Greece, Bulgaria, Spain, Slovakia and Italy, accounting for firm characteristics has significantly reduced their RIR. However, for the Netherlands, Denmark and Germany, the opposite is true. Table 4 also explores how RIR ranks have changed once firm controls are included. While the RIR rank has changed in most countries, the mean change is small (1.2 places), and the change in rank is either zero or one place for sixteen of the twenty countries. From a policy perspective, the key take-away from Table 4 is that the substantial variation in aggregate interest rates observed across European countries is unlikely to be explained by differences in measurable SME characteristics.

---

7 We acknowledge that coefficients from Model 1 are not residual interest rates, but raw differences in cross-country means. However, for purely exposition purposes, we have maintained the terminology 'RIR' for both.

Cross-country descriptive analysis

The previous section highlighted a number of firm characteristics which explain firm-level interest rates. However, controlling for such factors does not explain overall cross-country interest rate differences. This section attempts to build upon this finding by exploring broader country/bank-level factors which may play a role. For this, we refrain from using the RIR estimates used in Section 2 and rather rely on data on the average interest rate on NFC loans under €250,000 (our proxy for SME interest rates) in each country. These data are collated by the European Central Bank and we expect that this series is a more accurate representation of the overall cost of credit in each country, capturing as accurately as possible the cost of funds facing SMEs. The SAFE data, on the other hand capture interest rate information on overdraft borrowings only, and as mentioned, have very limited sample sizes for a number of countries.

In thinking about the type of country-level factors that may lead to higher SME interest rates, we categorise factors into the following groups:

1. **Bank fundamentals.** Here we include a measure of bank operating profits as a percentage of total assets, and a ratio of operating costs to operating income. We expect that poor profitability and high cost structures may lead banks to charge higher interest rates.[8] For example, Gambacorta (2008) finds that more efficient banks, in terms of both cost-to-asset and loan/deposits-to-branch ratios, have lower lending rates. For this we use aggregated consolidated banking data on profitability and costs for domestic banks in each country as of June 2014 (European Central Bank, 2016c).

2. **Cost of funds.** Accurate data on the cost of funds are difficult to collate. However, for a reduced sample of countries, a measure of the Weighted Average Cost of Liabilities (WACL) is calculated by Illes et al. (2015).

This measure incorporates information on costs and volumes of deposits, interbank funding, Central Bank funding and bank-issued securities. We use data provided by the authors for 2014. The expectation in this case is that higher funding costs should be passed on to SME borrowers in the form of higher borrowing rates.

3. **Recoverability of collateral.** The strength of creditor protection in domestic legal systems and the speed with which legal proceedings are concluded are key factors in determining the likely Loss Given Default (LGD) for SME lenders. In cases where the collateral recovery system is ineffective, we expect lenders to charge higher SME interest rates. The Recovery Rate on a hypothetical business loan, and the time to resolve an insolvency case, are both retrieved from World Bank *Doing Business* data for 2015.

4. **Default Risk.** Banks' perception of default risk is a key factor in the interest rate setting decision. We measure SME default risk in two ways: first, by the default rate on the stock of existing SME loans at December 2013; second, by the predicted 2016 impairment rate on corporate lending, as viewed at end-2013 in the European Banking Authority 2014 stress testing exercise.

5. **Measures of bank balance sheet weakness.** Closely related to measures of default risk outlined above, we also posit that the overall weakness of banks' balance sheets may lead to higher rates being passed to borrowers. This impairment of the transmission of monetary policy to the real economy during periods of financial market stress is generally termed "the bank lending channel" (see for example Bernanke (1983), Mishkin (1995), Bernanke and Gertler (1995)). We proxy banking sector stresses with the average CDS spread in each country in 2014 and the average 10-year government bond yield for the same period.

---

8   The analysis of Gambacorta focuses on 73 Italian banks between 1993 and 2001.

Figure 3: Relationship between SME Interest Rates and Bank Fundamentals – Linear Regression Line

Panel A

Panel B
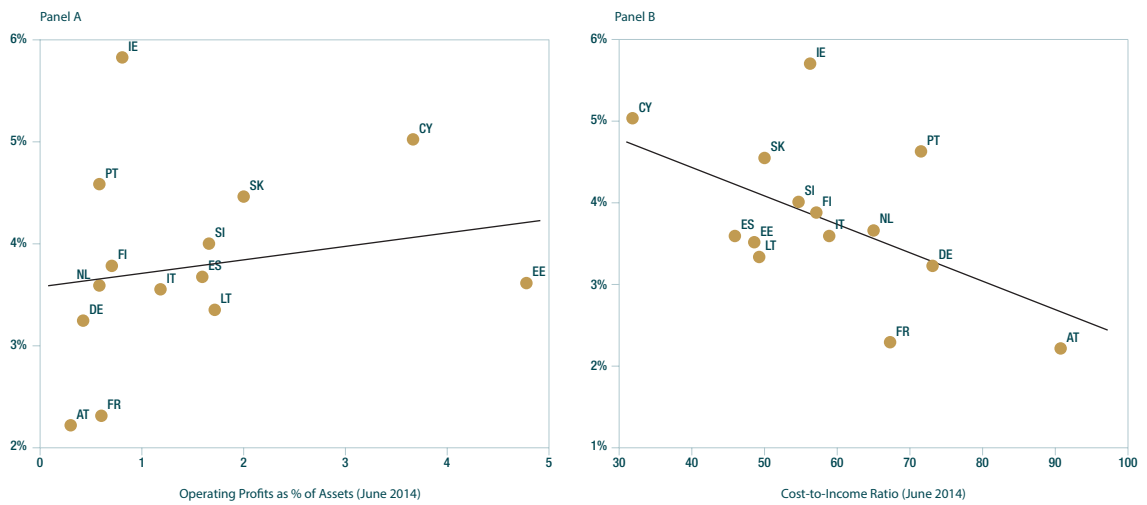
Source: Interest rate data sourced from ECB Monetary and Financial Statistics. Profit and cost ratios sourced from ECB Consolidated Banking Data.

Note: Banking profits/costs refer to domestic institutions as of June 2014. Interest rates are for new business loans to non-financial corporations on values up to and including €250,000 (proxy for SME interest rates) for the period from January to November 2015 (average).

6. **Macroeconomic performance.** The general economic environment may impact on banks' view of likely future defaults, as well as on their risk aversion. We measure the macroeconomy in two ways: first, using the simple level of the unemployment rate in 2014; second, by calculating an "unemployment gap" as the ratio of 2014 unemployment to the average unemployment rate in the pre-crisis period (2000-2008).

7. **Bank Competition.** As in any industry, standard economic theory suggests that where competitive forces are weaker, market participants may charge a higher price than that expected under perfect competition. We measure competition using the 3-bank and 5-bank concentration ratios reported by the World Bank's *Global Financial Development* data base.

Figure 3 plots the relationship between bank fundamentals and the SME interest rate. In neither case is the expected relationship

observed. In Panel A, there is no ascertainable relationship between bank profitability and interest rates, while in Panel B, the effect is in fact the opposite to that expected: banking systems with lower cost to income ratios (more efficient banks) appear to be charging higher rates.

Figure 4 focusses on a specific element of the bank's cost structure: the cost of funds. Accurate measures of the funding cost associated with each component of a bank's funding structure are not readily available in an internationally comparable format. A recent paper by Illes et al. (2015) has, however, attempted to calculate a Weighted Average Cost of Liabilities (WACL) for a subset of the countries under study in this paper. Panel A shows the short-term WACL, while Panel B shows the long-term WACL. These figures must of course be heavily caveated given that WACL data are only available for nine countries. In both cases, however, we do not observe higher SME interest rates in countries with higher WACLs.
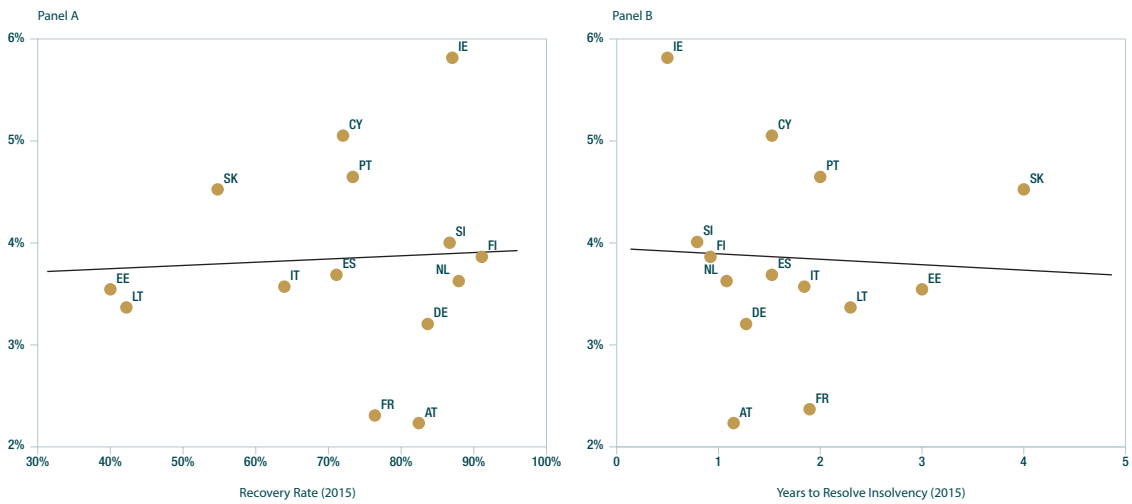
Figure 4: Relationship between SME Interest Rates and the Weighted Average Cost of Liabilities – Linear Regression Line
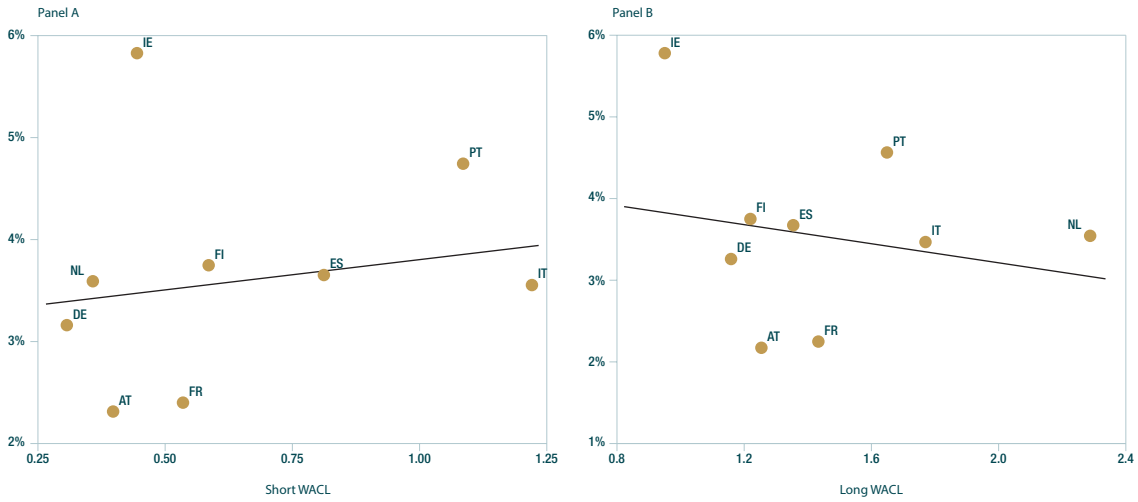
Source: Interest rate data sourced from ECB Monetary and Financial Statistics. WACL data from Ilies et al. (2015).

Note: Interest rates are for new business loans to non-financial corporations on values up to and including €250,000 (proxy for SME interest rates) for the period from January to November 2015 (average).

Figure 5: Relationship between SME Interest Rates and Insolvency Efficiency – Linear Regression Line

Source: Interest rate data sourced from ECB Monetary and Financial Statistics. Insolvency measures sourced from the World Bank's Doing Business 2016.

Note: The Recovery Rate is the share of debts recovered from insolvent firms. Interest rates are for new business loans to non-financial corporations on values up to and including €250,000 (proxy for SME interest rates) for the period from January to November 2015 (average)

Figure 6: Relationship between SME Interest Rates and SME Risk – Linear Regression Line

Panel A

Panel B
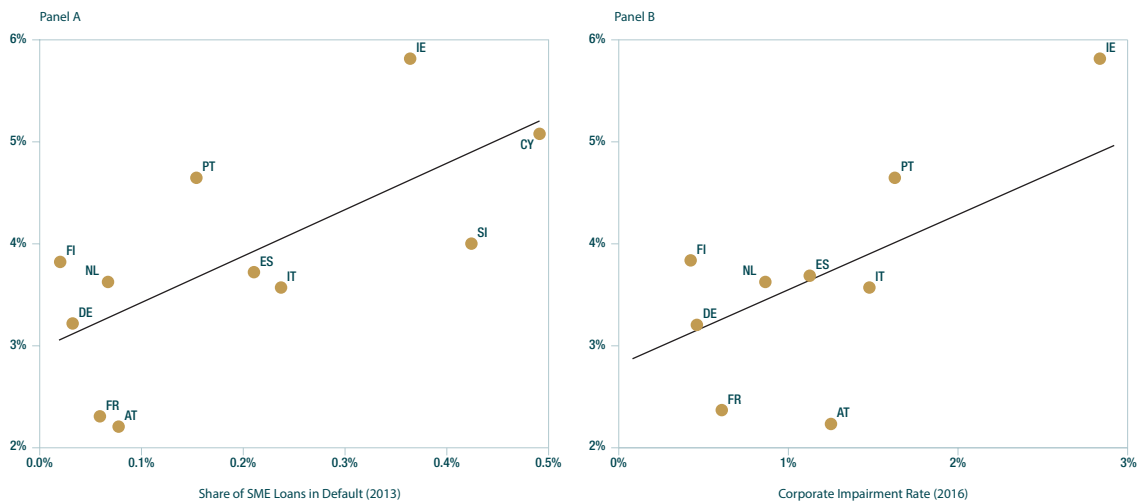
Source: Interest rate data sourced from ECB Monetary and Financial Statistics. Default and impairment rates calculated using the EBA 2014 stress test results.

Note: The share of SME loans in default is calculated by aggregating SME exposures across banks in each country. Corporate impairment rates are a weighted average across banks in each country (weighted by corporate exposures). In Panel B, we have excluded two outliers – Cyprus and Slovenia. Interest rates are for new business loans to non-financial corporations on values up to and including €250,000 (proxy for SME interest rates) for the period from January to November 2015 (average).

In Figure 5, we measure the "creditor-friendliness" of a country's institutional framework in two ways: first, the predicted recovery rate on a hypothetical standardised commercial loan and, second, by the time taken to resolve an insolvency proceeding against an insolvent enterprise. Both measures are provided by the World Bank's *Doing Business* data series for 2015, and both are interpreted as providing a measure of relative costs of recovering collateral, and therefore Loss Given Default (LGD). The expectation that a more creditor-friendly environment for business loan recovery will lead to lower SME interest rates is not borne out in either Panel A or B.

Both the recent default performance of SME loans and expectations for future defaults are expected to be a key determinants of firms' borrowing costs. Panel A of Figure 6 shows that there is a strong relationship between a high stock of defaults on SME lending at December 2013 and the subsequent 2015 cost of borrowing for SMEs. In Panel B, a

forward-looking measure of expected 2016 impairments on corporate lending under the adverse scenario of the 2014 EBA stress test shows a similar pattern. These data are highly valuable as they represent the only internationally comparable data on credit risk for the SME segment in particular. As one would expect and recommend from a prudential perspective, aggregate variation in credit risk appears to play a key role in determining the cost of borrowing for SMEs across Europe.

The findings of Figure 7 are consistent with the predictions of the "bank lending channel" literature: higher CDS spreads, a measure of the perceived riskiness of the banking sector, and likely related to many factors other than the quality of the pool of borrowing SMEs, are strongly associated with SME interest rates. We also show in Panel B that the 10-year government bond yield, another measure of macro-financial stress, is positively associated with higher borrowing costs for SMEs. These patterns suggest that it is more than the credit
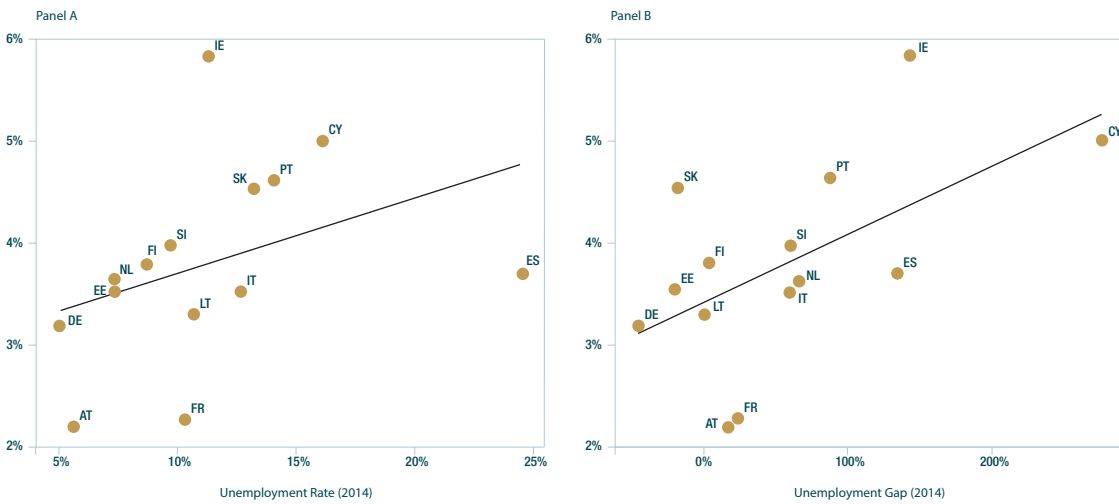
Figure 7: Relationship between SME Interest Rates and Bank/Country Risk Factors – Linear Regression Line
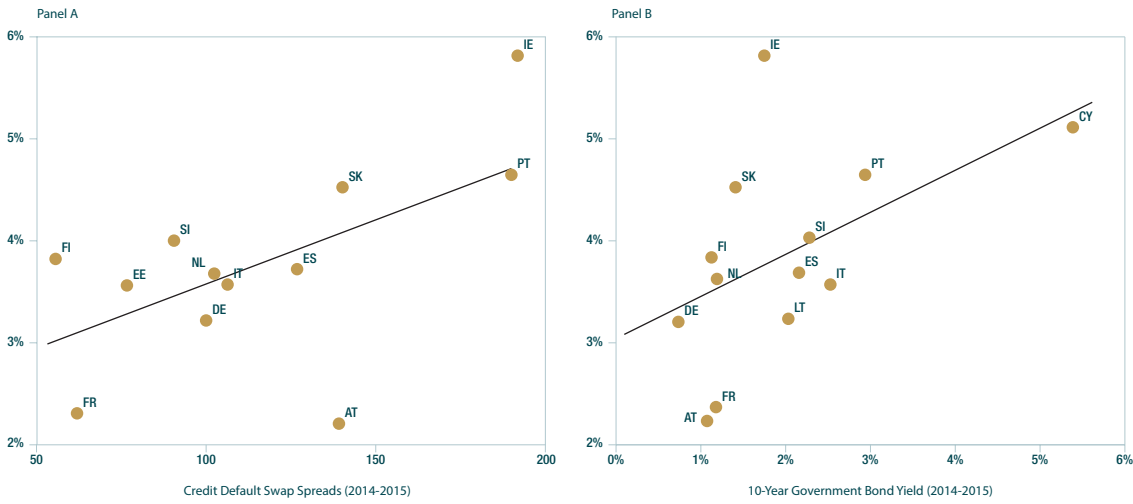
Source: Interest rate data sourced from ECB Monetary and Financial Statistics. Credit default swap spreads sourced from Datastream and ten-year government bond yields sourced from OECD.

Note: Credit default swap spreads refer to the mean monthly rates between January 2014 and June 2015 for all reporting banks in each country. We have excluded one outlier – Cyprus – from Panel A. Ten-year government bond yields are the mean between January 2014 and June 2015. Interest rates are for new business loans to non-financial corporations on values up to and including €250,000 (proxy for SME interest rates) for the period from January to November 2015 (average).

Figure 8: Relationship between SME Interest Rates and Macroeconomic Performance – Linear Regression Line

Source: Interest rate data sourced from ECB Monetary and Financial Statistics, unemployment from EUROSTAT.

Note: Unemployment gap is the deviation of unemployment in 2014 from pre-crisis average (2000-2008) as a percentage of pre-crisis average.

Figure 9: Relationship between SME Interest Rates and Bank Competition – Linear Regression Line

Panel A

Panel B

Source: Interest rate data sourced from ECB Monetary and Financial Statistics. Bank concentration measures sourced from the World Bank Global Financial Development database.

Note: Asset concentration is the combined market share of banks. Interest rates are for new business loans to non-financial corporations on values up to and including €250,000 (proxy for SME interest rates) for the period from January to November 2015 (average).

risk of SMEs that is at play when SME interest rates are being determined.

We also believe that aggregate macroeconomic performance is likely to impact on banks' views around likely future defaults, as well as their risk aversion. To explore this relationship, we include two measures of macroeconomic performance – the unemployment rate in 2014 and the unemployment gap, as defined above. Figure 8 displays the relationship between these variables and SME interest rates. Both the unemployment rate (Panel A), and the unemployment gap (Panel B) show a positive correlation, confirming that current macroeconomic factors likely play some role in the setting of SME interest rates.

Finally, we explore the relationship between interest rates and bank competition in Figure 9. As discussed in Ryan et al. (2014), there are two alternative theoretical predictions. The first – the *Market Power Hypothesis* – suggests that increased competition will lead to reduced interest rates and lower credit constraints. This prediction is in line with that

derived from a standard quantity-price model under oligopolistic competition which can be applied to any industrial setting. Alternatively, the *Information Hypothesis* suggests that increased competition makes it more costly for banks to invest in relationships with informationally opaque borrowers, which increases credit constraints. While previous research on credit access provides mixed results, two previous studies – De Graeve et al. (2007) and Gambacorta (2008) – find evidence that increased competition leads to lower lending rates, while both Ryan et al. (2014) and Carbo-Valverde et al. (2009) show that weaker competition leads to more pronounced credit constraints. Using banking sector concentration measures from the World Bank *Global Financial Development Database*, we also observe a positive correlation – countries with more concentrated (less competitive) banking sectors have higher SME interest rates. This suggests that the traditional view of higher pricing in less competitive markets is the predominant mechanism at play in post-crisis European banking. The relationship is of course not necessarily a causal one, in that both weak competition levels and high interest

rates may be driven by common underlying factors such as the restructuring of the financial system in the aftermath of the global financial crisis.

Conclusion

Interest rates on SME loans varied widely across European countries during 2015. In this article we aim to identify the firm and country-level characteristics associated with high SME lending rates. While firm characteristics explain individual interest rate decisions, controlling for such characteristics does not, in general, explain much of the cross-country variation observed. The results of our descriptive analysis of cross-country interest rate differentials can be summarised as follows: previous experience of SME defaults, forward-looking default predictions under stress scenarios, a larger crisis-induced macroeconomic shock, a more stressed banking sector, and weaker bank competition are all shown to be associated with higher SME borrowing costs in 2015. In short, it appears that impairments on the supply and demand side of the credit market are likely determinants of high borrowing costs. Conversely, measures of the cost of funds, banking sector profitability and cost efficiency, and the recoverability of collateral do not appear to have any association with SME interest rates. These findings can act to provide clarity to current debates around the high cost of borrowing in markets such as Ireland, as well as the heterogeneous reaction of SME rates to monetary easing across the euro area.

Bibliography

Bernanke, Ben S, 1983."Nonmonetary Effects of the Financial Crisis in Propagation of the Great Depression," American Economic Review, vol. 73(3), pages 257-76, June.

Ben S. Bernanke & Mark Gertler, 1995. "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," Journal of Economic Perspectives, vol. 9(4), pages 27-48, Fall.

Berger, Allen N. and Gregory F. Udell, "Relationship Lending and Lines of Credit in Small Firm Finance," *The Journal of Business*, 1995, 68 (3), pp. 351-381.

Carbó-Valverde, Santiago, Rodríguez-Fernández, F. and G.F. Udell, 2009. "Bank Market Power and SME Financing Constraints," *Review of Finance*, vol. 13(2), pages 309-340.

Central Bank of Ireland, "SME Market Report 2015 H2," https://www.centralbank.ie/publications/Documents/SME%20Market%20Report%202015H2.pdf 2016.

De Graeve, Ferre, Olivier De Jonghe and Rudi Vander Vennet, "Competition, transmission and bank pricing policies: Evidence from Belgian loan and deposit markets," *Journal of Banking & Finance*, 2007, 31, 259-278.

Degryse, Hans and Patrick Van Cayseele, "Relationship Lending within a Bank-Based System: Evidence from European Small Business Data," *Journal of Financial Intermediation*, 2000, 9, 90-109.

European Banking Authority, "2014 EU-wide stress test results,"

http://www.eba.europa.eu/risk-analysis-and-data/eu-wide-stress-testing/2014/results 2014.

European Central Bank, "Monetary and Financial Statistics," http://sdw.ecb.europa.eu/browse.do?node=2018773 2016.

– , "Survey on the Access to Finance of Enterprises," https://www.ecb.europa.eu/stats/money/surveys/sme/html/index.en.html 2016.

– , "Consolidated Banking Data," https://www.ecb.europa.eu/stats/money/consolidated/html/index.en.html 2016.

Gambacorta, Leonardo "How do banks set interest rates?," *European Economic Review*, 2008, 52, 792-819.

Gambacorta, Leonardo and Paolo Emilio Mistrulli, "Bank Heterogeneity and Interest Rate Setting: What Lessons Have We Learned since Lehman Brothers?," J*ournal of Money, Credit and Banking*, 2014, 46 (4), 753-778.

Harhoff, Dietmar and Timm Körting, "Lending relationships in Germany – empirical evidence from survey data," *Journal of Banking & Finance*, 1998, 22 (10), 1317-1353.

Hernández-Cánovas, Ginés and Pedro Martínez-Solano, "Relationship lending and SME financing in the continental European bank-based system," *Small Business Economics*, 2010, 34, 465-482.

Holton, Sarah and Constanza Rodriguez, "Jagged cliffs and stumbling blocks: Interest Rate Pas-through Fragmentation During the Euro Area Crisis, Central Bank of Ireland Research Technical Paper, 2015, 01RT15

Holton, Sarah, Martina Lawless and Fergal McCann, "SME Financing Conditions in Europe: Credit Crunch or Fundamentals?," *National Institute Economic Review,* 2013, 225 (1), R52-R67.

Sarah Holton, Martina Lawless and Fergal McCann, 2014. "Firm credit in the euro area: a tale of three crises," Applied Economics, vol. 46(2), pages 190-211, January.

Holton, Sarah and Fergal McCann (2016), "Sources of the small firm financing premium: Evidence from euro area banks", mimeo Central Bank of Ireland.

Illes, Anamaria, Lombardi, Marco and Paul Mizen, 2015. "Why did bank lending rates diverge from policy rates after the financial crisis?," BIS Working Papers 486, Bank for International Settlements.

Mishkin, F., 1995. "Symposium on the Monetary Transmission Mechanism," Journal of Economic Perspectives, American Economic Association, vol. 9(4), pages 3-10.

OECD, "Economic Outlook Annex Table," http://www.oecd.org/eco/outlook/ economicoutlookannextables.htm 2016.

Petersen, Mitchell A. and Raghuram G. Rajan, "The Benefits of Lending Relationships: Evidence from Small Business Data," *The Journal of Finance*, 1994, 49 (1), 3-37.

Rottmann, H. and T. Wollmershauser, 2013. "A micro data approach to the identification of credit crunches," Applied Economics, vol. 45(17), pages 2423-2441.

Ryan, R. M., O'Toole, C.M. and F. McCann, "Does bank market power affect SME financing constraints?," *Journal of Banking and Finance*, 2014, 49, 495-505.

Santos, Joao (2011), "Bank Corporate Loan Pricing Following the Subprime Crisis", *Review of Financial Studies* Volume 24, Issue 6, Pp. 1916-1943.

World Bank, "Doing Business 2016 – Measuring Regulatory Quality and Efficiency," http://www.doingbusiness.org/~/media/ GIAWB/Doing%20Business/Documents/ Annual-Reports/English/DB16-Full-Report.pdf 2016.