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published in

Small Business Economics
2019

DOI (link to publisher)

[10.1007/s11187-018-0056-y](https://doi.org/10.1007/s11187-018-0056-y)

document version

Publisher's PDF, also known as Version of record

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citation for published version (APA)

Mol-Gómez-Vázquez, A., Hernández-Cánovas, G., & Koëter-Kant, J. (2019). Bank market power and the intensity of borrower discouragement: analysis of SMEs across developed and developing European countries. *Small Business Economics*, 53(1), 211–225. <https://doi.org/10.1007/s11187-018-0056-y>

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Bank market power and the intensity of borrower discouragement: analysis of SMEs across developed and developing European countries

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Accepted: 10 April 2018 / Published online: 27 April 2018
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Abstract This paper analyzes the effect of bank market power on the financial constraints of small and medium-sized enterprises (SMEs) through the study of borrower discouragement. We use a cross-country sample of 2582 firms in 25 developed and developing European countries. Our results show that the intensity of borrower discouragement decreases with the level of bank market power, and this result is robust to the use of concentration and industrial organization measures of competition. When our model allows for non-monotonic effects, we show that more bank market power might increase borrower discouragement for firms operating in less developed economies and in countries with a high degree of bank market power. These results explain the conflicting evidence provided in previous literature concerning countries with different levels of economic development and bank market power. Our paper sets limits to the continuous concentration process in the

European banking market, which may result in more discouraged and financially restricted SMEs.

Keywords Borrower discouragement · Bank market power · Small business financing · Financial constraints

JEL classification G21 · G30 · G32 · L26

1 Introduction

Understanding the role of the banking sector structure in a firm's financial constraints has become an urgent priority in light of the ongoing transformation of the European financial landscape, which began two decades ago. During the period between 2008 and 2016, the total assets of euro area domestic banks declined about 14%, while the average number of credit institutions decreased by 25% (ECB 2017). According to the data obtained from the European Central Bank, the concentration of the banking system increased from the late 1990s to 2015 for most of the EU-28. This increase is particularly important for countries such as Spain, where the level of concentration increased by 223%, Greece (154%), Germany (139%), and the UK (126%). In addition, the wave of mergers and acquisitions (M&A) is likely to continue in the future, as the ECB recognizes that the consolidation of the European banking sector “could bring some profitability benefits at the sector level” (Constâncio 2017). However, the consolidation of the banking sector may negatively affect the availability of debt financing for small and medium-sized

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enterprises (Fungáčová et al. 2017; Han et al. 2017). This paper offers new empirical evidence on the potential effects of the banking transformation on credit channels. We examine how bank market power influences the financing constraints (borrower discouragement) of SMEs, and how the legal and institutional environments shape the influence of market power and provoke differences between developing and developed countries.

In credit markets without asymmetric information problems, less bank competition, i.e., more market power, reduces the availability of debt financing and increases its costs (Klein 1971). However, there are theoretical arguments for expecting a less negative effect of market power on smaller firms and different effects in developing and developed countries. These differences may arise because the existence of informational asymmetries critically drives the influence of bank market power on firms' access to debt financing. Credit markets characterized by high levels of informational asymmetries resort to banking relationships to facilitate the access of firms to debt financing (Beck et al. 2017). Less market power reduces the benefits of maintaining a close lending relationship, thus reducing the ability of banks to provide debt financing (Petersen and Rajan 1995). In addition, SMEs are a good example of credit markets where asymmetric information between the lender and borrower is important. Opaqueness and the lack of available assets to pledge as guarantees make SMEs especially vulnerable to asymmetric information problems (Hanedar et al. 2014). Based on the above arguments, we analyze whether the transformation of the banking system affects SMEs' access to debt through changes in market power, and whether a country's institutional and legal environment produces different results between developed and developing countries. We use a cross-country sample of 2582 firms in 25 European countries.

Our study contributes to the literature in several ways. First, we analyze the effect of bank market power on firms' financing constraints by analyzing the problem of discouraged borrowers, defined as firms that do not apply for a bank loan, even when they need the financial resources, because they anticipate high screening errors (Kon and Storey 2003). This phenomenon is, compared to other forms of financing constraints such as credit denial, less frequently studied in financial literature, despite its impact on the real economy. According to Levenson and Willard (2000), and data provided by the Surveys on the Access to Finance of Enterprises (carried out by the European Central Bank and the

European Commission between 2009 and 2015), firms are more likely to report discouragement than report rejection. In addition, we contribute to this literature by analyzing the intensity rather than the likelihood of financial constraints. By defining a count variable that measures the intensity of borrower discouragement from one to five, we are able to analyze whether bank market power intensifies or ameliorates the magnitude of the problem faced by discouraged borrowers. Our argument is that knowing the intensity of borrower discouragement helps to understand how far firms are from solving this problem and improving their access to debt financing. The more reasons discouraged borrowers have for their behavior, the more complicated it will be to reverse their discouragement. Using a zero-truncated Poisson count model, our results show that more market power reduces the intensity of borrower discouragement.

Second, we allow for a non-linear association between bank market power and borrower discouragement that may follow either a U-shaped or an inverted U-shaped relationship. Previous literature shows that the use of relationship lending may reach a minimum (maximum) at intermediate levels of competition (Yafeh and Yosha 2001; Degryse and Ongena 2007). Consequently, a positive or negative association between bank market power and borrower discouragement would dominate over different ranges of market power. We find that the association between bank market power and borrower discouragement reaches a minimum at high levels of concentration in our sample distribution. This implies that, for a small fraction of borrowers in our sample, discouragement increases with bank market power.

Third, we add to the borrower discouragement literature by analyzing a greater range of institutional differences from developed and developing countries. The existence of poor institutions intensifies informational asymmetries in developing countries, compared to developed economies (Levine et al. 2000; Claessens and Laeven 2004), which might moderate the effect of bank market power on the intensity of borrower discouragement. We therefore allow for the possibility that the non-monotonic effect of bank market power on borrower discouragement is not due to the degree of competition per se but to the interplay between market power and a country's institutional development. Our results show that more market power reduces the intensity of borrower discouragement for firms in high-income countries,

whereas we find the opposite association for firms in the least developed institutional environments. This would explain conflicting results in previous studies between those supporting the benefits of bank market power in developed countries (Han et al. 2009; Mac an Bhaird et al. 2016) and those in favor of more competition in less developed institutional environments (Leon 2015).

The article proceeds as follows. Section 2 discusses previous research and develops the hypotheses. Section 3 presents the variables, data, and method. Section 4 presents the results, and Section 5 concludes.

2 Theory and hypothesis development

Seminar papers by Petersen and Rajan (1995) and Boot and Thakor (2000) established the importance of bank market power in determining firms' access to debt financing throughout relationship lending. In credit markets with reduced information asymmetries, where little value is added through relationship lending, Boot and Thakor (2000) predict that more competition will increase relationship lending. In contrast, where information asymmetries are important, Petersen and Rajan (1995) state that more market power increases the profitability for banks of getting into close relationship lending and investing in the acquisition of soft information. The availability of more information enables banks to improve their due diligence process and reduce screening error when assessing the risk of potential opaque borrowers. This has a positive effect on credit markets, ameliorating the problem of borrower discouragement.

The benefits of relationship lending in facilitating access to debt financing for SMEs have been widely studied in the financial literature (see, for example, Hernández-Cánovas and Martínez-Solano 2010; Beck et al. 2017). The principal advantage of this lending technology is the possibility of entering into an intertemporal substitution where the initial investment made by the bank is rewarded with future benefits arising from the relationship. These expected benefits determine the value of relationship lending and, therefore, the willingness of banks to invest in gathering soft information about opaque potential borrowers. However, for those benefits to generate enough value, the relationship must last and involve a large number of financial products. This will only be possible if banks have enough market power to keep (lock in) firms in a long and broad

relationship, where less competition increases the value of relationship lending, thus facilitating the task of servicing loans for banks. Otherwise, firms may quit the relationship and change to another lender before the relationship bank has had enough time to recover the initial investment. Following these arguments, our first hypothesis is as follows:

Hypothesis 1: The intensity of borrower discouragement for SMEs decreases with bank market power.

Previous empirical evidence provides ambiguous predictions and shows the existence of a possible heterogeneous association between bank market power and borrower discouragement. Results provided by Han et al. (2009), using a sample of small US firms, and by Mac an Bhaird et al. (2016), using an international sample of SMEs from 8 Western European countries, show that firms are less likely to be discouraged as concentration increases. However, Leon (2015) shows that more competition ameliorates borrower discouragement for firms in 69 developing countries.¹ This non-monotonic effect of market power on borrower discouragement could be explained by the existence of an (inverted) U-shaped association between borrower discouragement and the degree of bank market power.

The U-shaped association between bank concentration and relationship lending found in Elsas (2005) and Degryse and Ongena (2007) allows for the possibility that the mechanisms modeled by either Petersen and Rajan (1995), or Boot and Thakor (2000), would dominate over different ranges of market power. At low levels of concentration, when the market is competitive, more competition triggers the use of relationship lending technology. This would support the strategic view modeled by Boot and Thakor (2000), in which relationship lending becomes a competitive advantage that helps insulate the relationship bank from outside banks competition. However, at high levels of concentration, when the market is less competitive, more market power facilitates the establishment of a relationship. Here, the investment nature of relationship lending in Petersen and Rajan (1995) holds, and market power helps banks to extract the informational rent that compensates for the resources invested in the relationship with the borrower. Therefore, the existence

¹ Firms in Leon (2015) can be considered small, as they have fewer than 60 employees, on average.

of a minimum in the association between market power and relationship lending would imply the existence of a maximum in the association between bank market power and the intensity of borrower discouragement. Following these arguments, our hypothesis 2a is as follows:

Hypothesis 2a: The association between bank market power and the intensity of borrower discouragement follows an inverted U-shape.

On the contrary, the models developed by Dinc (2000) and Yafeh and Yosha (2001) predict that bank investments in relationship lending reach their maximum with an intermediate number of banks and intermediate level of competition (inverted U-shape). More market power helps to establish banking relationships in environments that are competitive, while it diminishes the use of this lending technology if banks already have high levels of market power. Mahrt-Smith (2006) claims that companies establishing a banking relationship might be “informationally captured” (the so-called hold-up problem), because banks outside the relationship do not know the real risk the company has, thus increasing the costs incurred by firms when seeking financing from uninformed banks. Lack of bank competition might exacerbate this hold-up problem and reduce firms’ demand for close relationship lending as bank market power reaches a high level (Berger et al. 2008). Therefore, the existence of a maximum in the association between market power and relationship lending would imply the existence of a minimum in the association between bank market power and the intensity of discouraged borrowers. Following these arguments, our hypothesis 2b is as follows:

Hypothesis 2b: The association between bank market power and the intensity of borrower discouragement follows a U-shape.

In a broader, but related research area, the literature also suggests that debt availability is determined by a combination of bank market power and the institutional environment in which the firm operates. For example, previous studies show that more market power is related to better credit access for firms operating in developed countries, such as the USA (Petersen and Rajan 1995; Zarutskie 2006), Italy (Bonaccorsi di Patti and Dell’Ariccia 2004), or Germany (Fischer 2000). Ratti et al. (2008) confirms this effect showing that the

concentration of the banking sector in 14 Western European countries results in less financially constrained firms.² In contrast, Beck et al. (2004) show that bank concentration increases financing obstacles only for SMEs operating in less developed economies, and Love and Martínez Pería (2015) find that low competition diminishes firms’ access to finance in 53 developing countries. This finding is confirmed by Chong et al. (2013) using a sample of Chinese SMEs.³ The underlying argument is that poor institutions are characteristic to developing countries and may increase the intensity of information asymmetries (Levine et al. 2000; Claessens and Laeven 2004), resulting in additional and unbearable risk for banks. Consequently, the profitability and feasibility of relationship lending for smaller firms should be higher in developed countries. Following these arguments, our hypothesis 3 is as follows:

Hypothesis 3: The association between bank market power and the intensity of borrower discouragement is more negative (less positive) in developed countries.

3 Variables, data and method

3.1 Independent variables

This section describes the explanatory variables used in our empirical study. Table 1 provides detailed definitions of all the variables, while Table 2 reports the correlations.

Bank market power variables Traditionally, financial literature has represented the market power of banks using concentration measures. The idea is that the more concentrated the banking system becomes, the lower the level of competition will be. Therefore, previous literature has used measures of concentration as an inverse indicator of the intensity of competition (Petersen and

² Evidence provided by Ryan et al. (2014) for a sample that combines SMEs operating in developed and developing European countries suggests that bank market power exacerbates SME financing constraints. However, they do not allow for heterogeneous effects across institutional environments.

³ In the same line, Hainz (2003) shows that the demand for collateral (as a way to extract rents) increases with the market power of banks in transition economies such as Romania and Estonia.

Table 1 Variables, descriptions, and data sources

Variable name	Description and source
Dependent variable	
Discouraged ^a	A measure of the intensity of borrower discouragement, constructed by adding a “1” for every one of the following reasons which would have encouraged firms to resort to a loan: (1) lower interest rates; (2) simpler procedures for granting loans; (3) less demanding guarantee requirements; (4) shorter delays in granting loans; and (5) other reasons. Discouraged ranges from 1 to 5, where higher scores indicate higher discouragement intensity.
Bank market power variables	
HHI ^b	The Herfindahl-Hirschman index is a measure of market power in the banking sector obtained by adding the squares of the market shares of all the credit institutions in the banking sector. It ranges from 0 to 1, where higher values indicate a more concentrated banking system.
CR5 ^b	A measure of market power in the banking sector, calculated as a fraction of assets held by the five largest credit institutions in the country in 2003.
Lerner ^c	A measure of market power in the banking market in 2003. It is defined as the difference between output prices and marginal costs (relative to prices). Prices are calculated as total bank revenue over assets, whereas marginal costs are obtained from an estimated translog cost function with respect to output. Higher values of the Lerner index indicate less bank competition. Calculated from underlying bank-by-bank data from Bankscope.
Institutional environment variables	
GDP per capita ^d	GDP per capita is the natural logarithm of GDP per capita in current prices in US dollars, divided by the population in 2003.
GDP growth ^d	Ratio of GDP growth expressed in current prices in US dollars in the period 2002–2003.
Bonds ^b	A measure of the pressure on the banking system, calculated as a 6-month average of the 10-year government bond yield in 2003.
Enforce debt ^c	A measure of the efficiency of contract enforcement mechanisms in a country, calculated as the official cost of going through court procedures for debt recovery, divided by the debt value in 2003.
Credit info ^c	A measure of rules and practices affecting the coverage, scope, and accessibility of credit information available through either a public credit registry or a private credit bureau in 2003. This variable is computed as an index that ranges from 0 to 6, with higher values indicating the availability of more credit information.
Recovery ^c	A measure of the efficiency of foreclosure or bankruptcy procedures in 2003. It estimates how many cents on the dollar claimants, including creditors, tax authorities, and employees, recover from an insolvent firm.
Firm-specific variables	
Size ^a	Categorical variable that ranges from 1 for those firms with an annual turnover of below 0.25 million Euros in the last year to 7 for those firms with an annual turnover of above 5 million Euros in the previous year.
Age ^a	Categorical variable that ranges from 1 for those firms that have been in operation less than 2 years to 6 for those firms that have been in operation more than 30 years.
Growth ^a	Dummy variable that takes the value 1 if the firm has increased the number of its employees since the last year and 0 otherwise.
Family ^a	Dummy variable that takes the value 1 if the capital of the company is exclusively family-owned, family-owned and held by individuals, or family-owned and held by one or several companies and 0 otherwise.
Restriction ^a	Categorical variable that ranges from 1 to 4, gathering the opinion of the firm’s management regarding the accessibility to loans granted by banks. A value of 1 denotes very easy access, whereas very difficult access is coded with a 4.
Relation ^a	Categorical variable that ranges from 1 to 4, gathering the opinion of the firm’s management on whether the bank wants to take risks in lending to their company. Higher scores denote a better relationship with the bank.
Industry ^a	An industry classification of the firm obtained from the answer to the survey question: “What is the main activity of your company?”, which we use to define seven industry dummies. Each variable takes the value 1 if the firm belongs to one of the following sectors: the extraction or production of raw materials, construction or civil engineering, the production and manufacturing of goods, trade and distribution, transport, services to businesses, and services to consumers and 0 otherwise.

^a Survey on SMEs Access to Finance carried out by the European Commission between 2005 and 2006^b European Central Bank^c Global Financial Development Database, the World Bank^d United Nations Statistics Division^e Doing Business Indicators 2005, the World Bank

Table 2 Correlations

	Discouraged	HHI	Lerner	Size	Age	Growth	Family
HHI	-0.0466**						
Lerner	-0.3078***	0.1777***					
Size	-0.1035***	0.0278	-0.0260				
Age	-0.0656***	-0.0575**	-0.1167***	0.1903***			
Growth	0.0268	0.0444*	0.0359	0.1638***	-0.1310***		
Family	-0.0159	-0.0694***	0.0382*	-0.2489***	0.0642***	-0.0485**	
Restriction	0.1864***	-0.1228***	-0.2908***	-0.0902***	-0.0504**	-0.0646***	0.0067
Relation	-0.0961***	0.0753***	0.1353***	0.0571**	0.0334	0.0366	-0.0262
GDP per capita	-0.3489***	-0.2155***	0.1291***	0.0835***	0.2676***	-0.0943***	0.1385***
GDP growth	-0.3003***	0.2163***	0.4790***	0.0264	-0.0895***	-0.0149	-0.0325
Bonds	0.2898***	0.1142***	0.0971***	-0.0585**	-0.2169***	0.0979***	-0.0752***
Enforce debt	-0.0923***	-0.1998***	0.0094	-0.0291	0.0149	-0.0400*	0.0319
Credit info	0.0465**	-0.3163***	-0.3407***	0.0016	0.0411*	-0.0471**	0.0527**
Recovery	-0.1327***	0.1168***	0.2026***	-0.300	0.0130	0.0090	0.0763***
	Restriction	Relation	GDP per capita	GDP growth	Bonds	Enforce debt	Credit info
Relation	-0.3276***						
GDP per capita	-0.0295	-0.0854***					
GDP growth	-0.1311***	0.0783***	0.1159***				
Bonds	0.0553**	0.0122	-0.6565***	-0.2449***			
Enforce debt	-0.0267	0.0996***	0.0871***	0.2395***	-0.2125***		
Credit info	0.1223***	-0.1039***	0.2477***	-0.2980***	-0.3575***	0.2482***	
Recovery	-0.0837***	0.0081	0.2613***	-0.1975***	-0.2473***	0.0021	0.4028***

Table 2 reports pairwise correlation coefficients. Descriptions and sources of all variables are reported in Table 1

*, **, and *** denote significance at the 10, 5, and 1% levels, respectively

Rajan 1995; Han et al. 2009). Following this trend in literature, as a proxy for the level of market power in the banking system, we use the Herfindahl-Hirschman Index (*HHI*), which is calculated by adding the squares of the market shares of all credit institutions in the banking sector. This measure is widely used in banking literature (Mercieca et al. 2009; Canton et al. 2013; Cole and Sokolyk 2016) and ranges from 0 to 1, where higher values represent a more concentrated banking system. As an alternative measure of banking concentration, following Beck et al. (2004) and Leon (2015), we also use the variable *CR5*, which measures the ratio of the assets of the five largest commercial banks as a share of total commercial banking sector assets.

However, recent studies argue that concentration and competition represent different aspects of bank market power (Carbó-Valverde et al. 2009; Mercieca et al. 2009) and provide evidence showing that they are not negatively correlated (Claessens and Laeven 2004; Canton et al. 2013). Moreover, the industrial organization literature

argues that the Lerner index is superior to concentration measures of market power (Dell'Ariccia 2001). As for the studies in banking, empirical evidence shows that the *HHI* as a measure of market power lacks consistency and robustness (Berger 1995; Hannan 1997), while Carbó-Valverde et al. (2009) find conflicting results using the Lerner index and *HHI* as alternative market power measures. Therefore, as a proxy for bank market power, we include the variable *Lerner*, where higher values indicate a lower level of bank competition.

Institutional environment variables We control for additional heterogeneity across European countries by including a set of institutional environment variables. To represent general economic conditions, we include the variables *GDP per capita*, *GDP growth*, and *bonds*. Evidence provided by Popov (2013) shows that firms located in more developed countries and faster-growing economies are less likely to feel discouraged, while Mac an Bhaird et al. (2016) argue that an increase of

sovereign bond yields decreases the number of potential applicants and increases the likelihood of discouragement. Empirical evidence also suggests that an effective institutional infrastructure favors firms' use of external funds, while companies in poorer contracting environments depend more on internal funds (Qian and Strahan 2007). We control for institutional infrastructure by including the variables *enforce debt*, *credit info*, and *recovery*.

Firm-specific variables We include several firm-specific characteristics to control for firm heterogeneity in our sample. For example, with the variables *size* and *age*, we take into account that there is more available information (both public and private) on older and larger firms, which improves the screening process carried out by banks (Cole and Sokolyk 2016; Bernini and Montagnoli 2017). Positive *growth* might be associated with an optimistic outlook and a healthy financial situation, which may result in lower discouragement, as shown in Mac an Bhaird et al. (2016). Freel et al. (2012) show that *family* firms are less discouraged from applying for financing, probably because they have a higher need for external funding. We follow Mac an Bhaird et al. (2016) and include the variables *restriction* and *relation* to control for managers' perceptions about the credit market. Borrower discouragement should decrease if managers perceive that access to finance is easy and banks are willing to lend. Finally, we include seven *industry* dummies. Freel et al. (2012) find that firms in knowledge-intensive industries, which rely more on human capital than tangible assets, are more likely to be discouraged from applying for a loan.⁴

3.2 Dependent variable

We consider discouraged borrowers to be those firms that have not applied for a loan but would have been encouraged to resort to borrowing if one or several of the following factors had been more advantageous: (1) interest rates, (2) procedures for granting loans, (3) guarantee requirements, (4) delays in granting loans, and (5) other reasons. A lower interest rate is the element that would have

encouraged most of the firms in our sample to apply for a loan (71.22%), followed by simpler procedures for granting loans (44%), less demanding guarantee requirements (43.76%), shorter delays in granting loans (29.90%), and other reasons (10.15%).

Using these answers from the survey question, we measure the level or intensity of borrower discouragement counting the number of reasons given by each firm and building the variable *discouraged*. This variable ranges from 1 to 5, where higher scores indicate higher discouragement levels, and its count nature means that the actual values taken by the dependent variable do matter. For example, borrower discouragement for firms with two reasons is twice as intense as it is for firms with only one reason. Out of the 2582 discouraged borrowers in our sample, Table 3 shows that almost half of them (47.21%) experience multiple discouragement, with 16.58% of the firms giving two reasons and 16.92% reporting up to four reasons for being discouraged. In addition, there is a high variation in the intensity of borrower discouragement across countries. In more than half of the countries in Table 3 (13 out of 25), firms reporting more than one reason for being discouraged are the most common, while in eight countries, more than half of their firms recognize that there are three or more reasons for not applying for financing. All this suggests that the traditional study of the likelihood of borrower discouragement might be incomplete because discouraged firms are classified as a homogenous group, when in fact, they are suffering from different degrees of this financial problem. Rather than hiding these differences, our study exploits them, and only considers discouraged borrowers, in order to analyze whether bank market power intensifies or ameliorates their financing problem.

Table 4 includes an overview of the three measures of bank market power ranked in descending order of economic development. We observe that bank market power seems to exhibit a non-monotonic relationship with the level of economic development. Bank market power can achieve similar values in both rich and poor countries, such as in Ireland and Poland, respectively. However, Table 4 shows a clear association between borrower discouragement and economic development. Firms in nine out of the ten poorest countries in our sample experience multiple discouragements, while this

⁴ In the interest of brevity, the industry dummies are not shown in the tables and their results are not discussed.

Table 3 Overview of borrower discouragement by country ranked in descending order

Country	Discouraged (mean)	1 Reason (%)	2 Reasons (%)	3 Reasons (%)	4 Reasons (%)	5 Reasons (%)	Number
Cyprus	3.6667	4.76	4.76	23.81	52.38	14.29	42
Poland	3.0468	10.53	25.73	21.05	33.92	8.77	171
Lithuania	3	9.09	21.21	36.36	27.27	6.06	33
Czech Republic	2.7857	19.39	24.49	21.43	27.55	7.14	98
UK	2.7742	24.52	16.13	16.77	42.58	0	155
Malta	2.75	27.5	12.5	25	27.5	7.5	40
Latvia	2.7143	24.29	21.43	17.14	32.86	4.29	70
Germany	2.71	22	19	26	32	1	200
Slovakia	2.6522	39.13	11.59	8.70	26.09	14.49	69
Hungary	2.4095	34.29	20.95	18.10	22.86	3.81	105
Slovenia	2.3108	40.54	16.22	16.22	25.68	1.35	74
Estonia	2.3019	41.51	15.09	18.87	20.75	3.77	53
Luxembourg	2.0448	44.78	22.39	16.42	16.42	0	67
Belgium	1.8051	55.08	18.64	16.95	9.32	0	118
France	1.6019	60.66	25.59	6.64	7.11	0	211
Italy	1.5182	69.55	16.82	5.91	7.73	0	220
Austria	1.4583	68.75	20.83	6.25	4.17	0	96
Finland	1.3846	84.62	2.56	2.56	10.26	0	39
Greece	1.3333	75	20.83	0	4.17	0	72
Ireland	1.2642	90.57	0	1.89	7.55	0	53
Portugal	1.25	86.36	6.82	2.27	4.55	0	44
Sweden	1.2326	84.50	10.85	1.55	3.10	0	129
The Netherlands	1.2269	84.87	10.92	0.84	3.36	0	119
Denmark	1.22	82	15	2	1	0	100
Spain	1.1275	92.65	4.41	0.49	2.45	0	204
Total	1.9903	52.79	16.58	11.58	16.92	2.13	
<i>N</i>	2582	1363	428	299	437	55	

Table 3 gives an overview of the number of reasons for borrower discouragement by country ranked in descending order. Descriptions and sources of all variables are reported in Table 1

only happens for firms in two out of the ten richest countries.

3.3 Data and method

To create our initial sample, we use several data sources. Country-specific variables are obtained from the European Central Bank, the United Nations Statistics Division, and the World Bank. Firm-specific variables come from two identical Flash Eurobarometer Surveys on Access to Finance conducted in September 2005 for the 15 old Member States of the European Union (EU), and between April and May 2006 for the 10 newer Member States (Bulgaria, Romania and Croatia are not

represented because they joined the European Union after 2006).⁵ Together, the datasets cover 4583 firms in the 25 EU countries, of which 3047 firms (66%) belong to the EU-15 and the remaining 1536 firms (34%) belong to the EU-10. Companies that were not in the agriculture, public administration, or non-profit sector and that employed from 1 to 249 people were eligible to participate.

From the 4583 interviews available in the survey, we drop 125 firms working in the financial sector. From the

⁵ The period under study in this paper is limited by data availability. However, we do believe that analyzing borrower discouragement just before the beginning of the financial crisis is important, because future contributions could use our results to compare its determining factors before, during and after the financial crisis.

Table 4 Overview of bank market power ranked in descending order of GDP per capita

Country	GDP per capita	HHI	CR5	Lerner index	Discouraged
Luxembourg	65,325	0.038	0.3599	0.1649	2.0448
Ireland	39,631	0.06	0.4442	0.1811	1.2642
Denmark	39,488	0.1114	0.6657	0.2891	1.22
Sweden	35,221	0.076	0.5379	0.2703	1.2326
The Netherlands	33,356	0.1744	0.8417	0.1427	1.2269
Finland	31,522	0.242	0.8117	-1.6087	1.3846
Austria	31,218	0.0557	0.442	0.2208	1.4583
UK	31,134	0.0347	0.3275	0.2008	2.7742
Belgium	30,251	0.2063	0.8347	0.1446	1.8051
Germany	29,384	0.0173	0.2163	0.0267	2.71
France	28,917	0.0597	0.4669	0.1451	1.6019
Italy	26,172	0.024	0.275	0.1451	1.5182
Spain	21,023	0.0506	0.431	0.2854	1.1275
Cyprus	18,256	0.0946	0.572	0.1432	3.6667
Greece	17,356	0.113	0.669	0.2671	1.3333
Portugal	15,472	0.1043	0.6272	0.1241	1.25
Slovenia	14,617	0.1496	0.6641	0.3149	2.3108
Malta	12,648	0.158	0.7768	0.2333	2.75
Czech Republic	9343	0.1187	0.6577	0.0841	2.7857
Hungary	8243	0.0783	0.5215	0.2405	2.4095
Estonia	7282	0.3943	0.9918	0.2129	2.3019
Slovakia	6151	0.1191	0.6747	0.1435	2.6522
Poland	5676	0.0754	0.5202	0.0515	3.0468
Lithuania	5424	0.2071	0.8103	0.1522	3
Latvia	4775	0.1054	0.6309	0.2614	2.7143

Table 4 gives an overview of the three measures of bank market power and GDP per capita (in levels) ranked in descending order of economic development. Descriptions and sources of all variables are reported in Table 1

remaining, we select 2582 observations containing information about borrower discouragement, i.e., firms that have not applied for a loan but would have been encouraged to resort to borrowing if one or several of the factors described in the previous section had been more advantageous. Finally, after dropping 39 observations due to extreme values, and 657 firms due to missing values in the explanatory variables, we obtain the sample of 1886 firms used in our regressions.

Table 5 shows a summary of the statistics for all the variables in our model. The *HHI*, *Lerner*, and *CR5* variables show that, on average, European SMEs operate in countries with moderate levels of bank market power. Regarding the institutional environment, on average, countries still have room for improvement in their levels of efficiency. The cost of enforcing debt contracts remains at around 12%,

claimants recover 60 cents on the dollar from insolvent firms during bankruptcy procedures, and the development of public and private information infrastructures scores below 5 on a 0–6 scale. As for firm-specific characteristics, the variable *size* has an average value of 3.4, which corresponds to micro firms with an annual turnover of between half a million and two million Euros, while a mean value of 4 for the variable *age* indicates that the average firm has been in business between 10 and 20 years. We should also highlight that in more than 75% of the firms in our sample, the capital is family-owned, and that 24.71% of SMEs grew during the previous year.

Because of the discrete and non-negative count nature of the dependent variable *discouraged*, we estimate a zero-truncated Poisson count model to examine the

Table 5 Summary statistics

	Mean	Std. dev.	Min.	Max.	Number
Discouraged	1.9608	1.2046	1	5	1886
Lerner	0.1737	0.0853	0.0267	0.3149	1886
HHI	0.0812	0.0528	0.0173	0.2071	1886
CR5	0.5079	0.1829	0.2163	0.8417	1886
GDP per capita	9.9051	0.6509	8.4711	10.5874	1886
GDP growth	0.2311	0.0549	0.0940	0.3600	1886
Bonds	0.0471	0.0079	0.0419	0.0736	1886
Enforce debt	0.1209	0.0398	0.0590	0.2110	1886
Credit info	4.7269	1.2197	3.0000	6.0000	1886
Recovery	0.6030	0.2080	0.1680	0.8890	1886
Size	3.4099	2.1471	1	7	1886
Age	4.1315	1.5518	1	6	1886
Growth	0.2471	0.4314	0	1	1886
Family	0.7858	0.4104	0	1	1886
Restriction	2.4464	0.8387	1	4	1886
Relation	1.9883	1.0217	1	4	1886

Table 5 gives an overview of sample statistics. Descriptions and sources of all variables are reported in Table 1

influence of bank market power on the intensity of borrower discouragement.⁶ The model presents the following form:

$$DB_i = \alpha_0 + \beta_1 BMP_i + \beta_2 IE_i + \beta_3 FSC_i + \varepsilon_i \quad (1)$$

where i represents the i th firm in the sample, DB_i is the dependent variable for the firm i , BMP_i represents the vector of bank market power variables, IE_i is the vector of institutional environment variables, FSC_i represents the set of firm-specific control variables, and ε_i is the residual.⁷

⁶ We use the Poisson count model instead of the alternative negative binomial regression because we cannot reject the hypothesis that the dispersion parameter is equal to zero. Therefore, our data is over-dispersed, validating our decision to use a Poisson count model instead of a negative binomial count model (Cameron and Trivedi 1990). In addition, since our dependent variable *discouraged* cannot take the value zero, we use a zero-truncated Poisson count model which analyzes models that are left truncated on any value, not just zero.

⁷ The survey was carried out at the end of 2005 and the beginning of 2006, and it gathers information about borrower discouragement in the recent past, but without establishing a specific period. Therefore, we choose to measure the bank market power and the institutional environment variables in 2003, rather than in 2004. Collecting these country variables from this time is a conservative decision that we undertake to avoid reverse causality (or simultaneity). When we check the robustness of our results by measuring the bank market power and institutional environment variables in 2004, we find that our results remain qualitatively the same.

4 Results

Table 6 starts with three regressions aimed at analyzing the effect of bank market power on the intensity of borrower discouragement, while controlling for the institutional and firm-level variables. Table 6 shows that the coefficient on the variables *Lerner* and *CR5* is negative and statistically significant (at the 1% level), whereas the negative coefficient for the variable *HHI* is not statistically significant.⁸ These results support our first hypothesis and suggest that more bank market power facilitates the use of relationship lending as a technology that improves the flow of information and reduces borrower discouragement among SMEs. The economic impact of market power is significant. For

⁸ We run two robustness checks of our results. First, we use an alternative measure of banking concentration obtained from the World Bank. Following Beck et al. (2004) and Leon (2015), we use the fraction of assets held by the three largest commercial banks in a country in 2003. The results remain qualitatively the same after using this alternative concentration measure of bank market power. Second, we estimate quantile regressions for count data in order to identify varying relationships at different parts of the distribution of the dependent variable. Results, available upon request, show that the effect of our bank market power variables remains negative across the 90th and 10th quantiles of borrower discouragement intensity. Therefore, we can discard the possibility that our bank market power variables have a positive effect at one part of the distribution of the dependent variable and a negative effect at the other extreme.

Table 6 Regressions of the intensity of borrower discouragement on bank market power and firm-level variables

	(1)	(2)	(3)
Constant	3.3250*** (0.6772)	4.5587*** (0.6978)	6.0184*** (0.8286)
Bank market power variables			
Lerner	- 1.9286*** (0.4728)		
HHI		- 0.1753 (0.6139)	
CR5			- 0.7172*** (0.2158)
Institutional environment variables			
GDP per capita	- 0.3199*** (0.0533)	- 0.4041*** (0.0555)	- 0.4855*** (0.0589)
GDP growth	- 1.2362* (0.6867)	- 2.7203*** (0.5459)	- 2.3594*** (0.5384)
Bonds	12.4451*** (4.2228)	3.8676 (3.7716)	0.5764 (3.8587)
Enforce debt	0.4592 (0.7861)	0.0008 (0.7865)	- 0.5285 (0.8448)
Credit info	0.0738*** (0.0288)	0.1102*** (0.0298)	0.0639* (0.0333)
Recovery	- 0.4968*** (0.1388)	- 0.7987*** (0.1164)	- 0.6570*** (0.1224)
Firm-specific variables			
Size	- 0.0389*** (0.0116)	- 0.0355*** (0.0117)	- 0.0347*** (0.0116)
Age	0.0128 (0.0171)	0.0197 (0.0171)	0.0172 (0.0172)
Growth	0.0390 (0.0510)	0.0398 (0.0511)	0.0401 (0.0507)
Family	0.0285 (0.0532)	0.0229 (0.0540)	0.0161 (0.0536)
Restriction	0.0934*** (0.0297)	0.1238*** (0.0294)	0.1100*** (0.0295)
Relation	- 0.0567** (0.0263)	- 0.0624** (0.0260)	- 0.0602** (0.0261)
Industry effects	Yes	Yes	Yes
Observations	1886	1886	1886
Adjusted R^2	0.1229	0.1189	0.1218

The dependent variable is *discouraged*. All specifications include industry fixed effects. Descriptions and sources of all variables are reported in Table 1. Robust standards errors are in parentheses

*, **, and *** denote significance at 10, 5, and 1% levels, respectively

example, a one standard deviation increase in the Lerner index results in a reduction of 15.28% in the intensity of borrower discouragement (12.16% for the variable *CR5*). Compared with other country and firm specific characteristics, the effect of bank market power is meaningful. For example, a one standard deviation increase in GDP per capita induces a reduction of 18.31% in the intensity of borrower discouragement, while the reduction achieved by increasing the size of the firm is only 8.11%.

As in previous works, our results show that borrowers operating in more developed countries (Leon 2015) or in higher growth economies (Chakravarty and Xiang 2013) are subject to lower levels of discouragement. Additionally, we show that borrower discouragement increases in countries with higher yields of government bonds or lower rates of recovery in bankruptcy procedures, which is in line with the results provided by Mac an Bhaird et al. (2016). We also find

a positive and statistically significant association between the variables *discouraged* and *credit info*. Contrary to our expectation, as the availability of data improves, the intensity of borrower discouragement increases.

Regarding firm-specific control variables, in Table 6, we find that smaller borrowers suffer from more intense discouragement, which is in line with previous evidence (Brown et al. 2011; Freel et al. 2012). In line with Mac an Bhaird et al. (2016), we find that the intensity of borrower discouragement increases if firms perceive that access to bank loans is difficult or if they have a negative perception of the willingness of banks to lend.

In Table 7, models 1–3, we include the quadratic terms of the variables *Lerner*, *HHI*, and *CR5*, respectively. This enables us to test hypotheses 2a and 2b, by analyzing the existence of a non-linear influence of bank market power on the intensity of borrower discouragement. The evidence shows statistically significant (at the

Table 7 Regressions of the intensity of borrower discouragement on bank market power and firm-level variables

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	3.3667*** (0.6894)	8.0013*** (0.7429)	9.8704*** (0.7978)	-1.0573 (0.8107)	8.0013*** (0.7429)	-24.3644*** (3.4911)
Bank market power variables						
Lerner	-2.6781* (1.3872)			32.2997*** (4.3560)		
HHI		-20.5327*** (2.1457)			68.2501*** (15.9445)	43.2075*** (5.3216)
CR5			-9.8904*** (0.9261)			
Lerner-squared	2.2171 (3.9358)			-4.7088 (4.1289)		
HHI-squared		89.4237*** (8.9564)			27.2839** (13.7585)	
CR5-squared			8.5374*** (0.8459)			2.7385*** (1.0095)
Lerner*GDP capita				-3.3575*** (0.3788)		
HHI*GDP capita					-7.4611*** (1.3442)	
CR5*GDP capita						-4.5825*** (0.4573)
Institutional environment variables						
GDP per capita	-0.3200*** (0.0531)	-0.5395*** (0.0557)	-0.5733*** (0.0515)	0.1875** (0.0812)	0.3999** (0.1839)	2.4654*** (0.3088)
GDP growth	-1.2033* (0.6876)	-3.7831*** (0.6160)	-3.6632*** (0.5936)	-3.3593*** (0.8695)	-4.0761*** (0.6624)	-5.1847*** (0.7108)
Bonds	12.3089*** (4.2587)	1.1306 (3.8185)	4.8476 (3.8691)	12.3532*** (3.5913)	17.2373*** (5.0869)	32.5593*** (4.9591)
Enforce debt	0.6167 (0.8507)	-0.4854 (0.8103)	-0.4253 (0.8167)	0.4469 (0.9066)	-1.9308** (0.7974)	-2.3954*** (0.8003)
Credit info	0.0696** (0.0304)	-0.0444 (0.0319)	-0.0965*** (0.0373)	0.0543* (0.0312)	0.1062** (0.0434)	0.0966** (0.0445)
Recovery	-0.4831*** (0.1362)	-0.7375*** (0.1442)	-0.4433*** (0.1555)	-0.4853*** (0.1511)	-0.6691*** (0.1284)	-0.5690*** (0.1272)
Firm-specific variables						
Size	-0.0395*** (0.0116)	-0.0323*** (0.0117)	-0.0345*** (0.0115)	-0.0338*** (0.0114)	-0.0262** (0.0115)	-0.0218* (0.0112)
Age	0.0135 (0.0171)	-0.0016 (0.0170)	0.0111 (0.0172)	0.0028 (0.0174)	0.0168 (0.0169)	0.0206 (0.0164)
Growth	0.0378 (0.0508)	0.0286 (0.0505)	0.0301 (0.0495)	0.0522 (0.0495)	0.0118 (0.0505)	0.0050 (0.0496)
Family	0.0262 (0.0531)	0.0085 (0.0536)	0.0019 (0.0525)	0.0056 (0.0525)	0.0066 (0.0538)	-0.0026 (0.0529)
Restriction	0.0922*** (0.0297)	0.0770*** (0.0291)	0.0596** (0.0288)	0.0710** (0.0289)	0.1027*** (0.0292)	0.1023*** (0.0287)
Relation	-0.0558** (0.0264)	-0.0532** (0.0259)	-0.0443* (0.0258)	-0.0472* (0.0259)	-0.0445* (0.0256)	-0.0321 (0.0252)
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1886	1886	1886	1886	1886	1886
Adjusted R ²	0.1230	0.1349	0.1394	0.1366	0.1423	0.1603

The dependent variable is *discouraged*. All specifications include industry fixed effects. Descriptions and sources of all variables are reported in Table 1. Robust standard errors are in parentheses

*, **, and *** denote significance at 10, 5, and 1% levels, respectively

1% level) coefficients for the concentration measures *HHI* and *CR5*, with a negative sign for the level variables and a positive sign for their quadratic terms. Therefore, the association between bank market power and borrower discouragement seems to follow a U-shaped relationship, which confirms our hypothesis 2b. The analysis of marginal effects also reveals that the minimum intensity of borrower discouragement appears around the 75th percentile for the variables *HHI* (0.115) and *CR5* (65%). Consequently, those firms operating in the most concentrated banking systems (around 25% of the firms in our sample) would benefit from better access to credit markets as bank market power decreases.

Next, in models 4–6, Table 7, we add the interaction terms of the variables *Lerner*, *HHI*, and *CR5* with the variable *GDP per capita* to test hypothesis 3. The coefficients for the three interaction variables are statistically significant (at the 1% level) and have a negative sign, while the quadratic effect seems to disappear in the three models. Therefore, as suggested by hypothesis 3, the non-monotonic effect of bank market power on borrower discouragement is not only due to the degree of market power per se. Our results indicate that institutional development moderates the effect of bank market power on the intensity of borrower discouragement. The Lerner model shows that greater market power reduces the intensity of borrower discouragement for firms in high, upper-middle and lower-middle income countries, whereas we find the opposite association for firms in the least developed institutional environments.⁹ For example, a one standard deviation increase in the Lerner index for firms in the richest (poorest) country in our regression results in a reduction (increase) in the intensity of borrower discouragement of 37% (17%). However, we cannot fully rule out that the non-monotonic effect of bank market power on discouraged borrowers is also due to the degree of concentration per se. For

⁹ In the *HHI* model, the reduction in the intensity of borrower discouragement as concentration increases is limited to high and upper-middle-income countries, while in the *CR5* model, only firms in high-income countries benefit from increased bank market power. Countries are categorized according to the 2003 *GDP per capita* and are then divided into four groups, according to quartiles: low income (\$9343 or less): Czech Republic, Hungary, Estonia, Slovak Republic, Poland, Lithuania, and Latvia; lower-middle income (\$9344–\$26,172): Spain, Cyprus, Greece, Portugal, Slovenia, and Malta; upper-middle income (\$26,173–\$31,134): UK, Belgium, Germany, France, and Italy; and high income (\$31,135 or more): Luxembourg, Ireland, Denmark, Sweden, The Netherlands, Finland, and Austria.

firms in a country with average economic development, the U-shaped relationship appears once again, in the *HHI* and the *CR5* models, when we compute the marginal effects of bank market power on borrower discouragement. Therefore, both the level of institutional development and the degree of concentration in the banking system are important in determining the effect of bank market power on borrower discouragement.¹⁰

5 Summary and conclusion

The process of the consolidation of financial markets around the world has changed the structure of the banking system significantly in the last two decades. According to the ECB (2017), the concentration of banking markets has been steadily increasing for most of the twentieth century. Understanding the effects of this transformation on credit availability has been the focus of attention in recent financial literature. The aim of this paper is to shed additional light on this problem by examining the association between borrower discouragement and the structure of the banking system through the study of bank market power. We use a survey dataset of 2582 small and medium-sized enterprises across 25 European countries, while controlling for firm and country-specific characteristics.

Our results show the existence of large variations in discouraged borrowers across European SMEs, which can be traced back to differences in the level of bank market power. In our base model, we find that borrower discouragement decreases as the banking system becomes less competitive, and this result holds for both concentration and industrial organization measures of bank market power. However, once we allow non-linear effects to take place, our results display a U-shaped association between borrower discouragement and the concentration measures of bank market power. In addition, when taking the institutional development of the country into account, SMEs operating in the poorest economies might end up being more discouraged and having more limited access to bank financing, because of increased bank market power.

¹⁰ Due to the strong correlation between the variables *Bonds* and *GDP per capita*, and the core importance of the later in our analyses, we check the robustness of our results by dropping the variable *Bonds* in Tables 6 and 7. The results remain qualitatively the same, indicating that there is not a collinearity problem in our regressions.

Our analyses also allow for the reconciliation of apparently conflicting results provided in the existing empirical literature. We show that institutional development moderates the effect of bank market power on borrower discouragement and explains varying results provided by previous studies across developed and developing countries. We also find the existence of a non-linear effect of banking concentration on discouraged borrowers, which may explain differences in results between studies using concentration measures of bank market power and those using industrial organization indexes.

The evidence presented in this paper has clear implications for firms, financial institutions, and policy makers. Firstly, firms should be aware of the ongoing changes triggered by the consolidation of the banking industry. Large financial institutions created by mergers and acquisitions may result in a decline in lending to firms of reduced dimensions, usually produced by the termination of lending relationships. Secondly, the capacity to supply credit to SMEs is a concern for financial institutions. They should consider our results to better understand discouraged borrowers and improve loan application and screening methods in order to achieve a better flow of financing towards SMEs. Finally, SME sustainability is the main concern of policy makers throughout Europe, because of their core contribution to innovation, job creation, and GDP growth. Since SMEs are highly dependent on bank debt, policy makers should consider our results to evaluate the possible negative consequences that the transformation of the banking system will have on their financing and survival. Our results show that increased concentration in the European banking system may result in more discouraged and financially restricted SMEs.

Funding information Ginés Hernández-Cánovas acknowledges financial support by Fundación Séneca (Project 15403/PHCS/10).

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