THE "HOLD-UP PROBLEM" AND BANKING RELATIONSHIPS: EVIDENCE FROM THE POLISH SME SECTOR

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Abstract
This paper investigates how lender-borrower relationships affect credit cost for small and medium sized companies (SMEs). We use data within the period 2006–2015 for the Polish SME sector and deploy panel regression models to analyse how the number and length of banking relationships influence the financial costs of a random sample of Polish SMEs. We document that the price of capital decreases as relationships progress. Outcomes of the research are thus inconsistent with the "hold-up" hypothesis. Moreover, we find evidence that supports the view that multiple banking relationships generate more financial benefits for companies than a relationship with one lender.

Keywords: banking relationship, hold-up problem, information asymmetry, bank lending
JEL Classification: G21, G32, D82

1. Introduction

Developing the SME sector was one of the main goals of the economic reforms enacted by the post-communist governments, since the relative absence of SMEs was regarded as one of the major causes of the under-performance of the centrally planned economies (Bateman, 2000). The considerable growth of this sector in Poland was predominantly supported by banks (Hasan *et al*., 2017). Radical changes were also observable in the banking sector, especially concerning bank ownership. The majority of the banking sector, previously run by the government, came under the control of foreign investors. This feature has distinguished the banking sector in Poland from other European banking sectors for a long time (Iwanicz-Drozdowska *et al*., 2018). Another distinctive trait of banks operating in Poland is their traditional business model: banks rarely conduct risky operations and their funding model is based mainly on customers' deposits (Słomka-Gołębiowska and Urbanek, 2016). Due to these characteristics, the Polish banking sector was affected by the financial crisis in 2008–2009 to a lesser extent than the banking sectors of other European countries.

It was often suggested that post-socialist countries should support the development of banking relationships as part of their financial system reforms (Hoshi *et al*., 1995). Banking relationships were considered as a means to stimulate the growth of the SME sector. During the transition from a centrally planned economy to a market economy, many newly established companies decided to engage in this form of cooperation with

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financial intermediaries[1]. Although it could be assumed that banking relationships made it possible for SMEs in Poland to obtain the funds necessary for their development, it is unclear whether this level of proximity between enterprises and banks generates more costs or profits for borrowers in the long run. This problem remains relevant, especially as academics have still not reached a consensus regarding the virtues and disadvantages of relationship banking, even for more mature economies.

There are two strands of literature regarding the abovementioned issue. According to the first, borrowers enjoy more favourable conditions of lending as their relationships progress (Boot and Thakor, 1994; Boot, 2000)[2]. As a result of these close ties, both sides are inclined to reveal more information (often of a proprietary nature) than in nonrecurring interactions (transaction banking), consequently mitigating problems of asymmetric information. Information obtained in interactions within a relationship may be reused (which is impossible in transaction-oriented banking) and, therefore, the costs of information gathering are significantly reduced. As a result, banks have better knowledge about their clients and are thereby more likely to offer them products at lower prices.

On the other hand, Sharpe (1990) and Rajan (1992) suggest that the proximity between borrowers and lenders leads to undesired consequences[3]. Instead of being used to the borrower's benefit, this additional information gathered thanks to relationship interactions, enables the lender to charge higher interest rates. As the cooperation progresses, the relationship bank begins to gain a competitive edge and may "lock" the borrower into the existing relationship. The informationally captured company is not able to change its lender, since non-relationship banks will not risk the so-called "winner's curse". It is believed that the relationship counterpart is better informed, so if a company approaches an outside bank (instead of the current lender), the project that it wants to finance is considered unlikely to succeed (due to factors that the non-relationship banks are unaware of). Hence, the relationship bank becomes a monopolist for the borrower[4]. The relationship lender acquires the power to enforce higher prices, and indirectly influence the investment policy of a borrower. All profits generated in the relationship are, therefore, captured by the financial intermediary (Weinstein and Yafeh, 1998).

This paper constitutes a unique attempt to answer the question whether banking relationships are a source of costs or profits for companies in a post-transition economy.

1 Sources of SME financing other than relationship banking (*e.g.*, transaction banking or non-bank sources such as private equity, stock exchanges or commercial papers) were largely unattainable for young companies characterised by a considerable level of risk.

2 More on this approach: Petersen and Rajan (1994), Berger and Udell (1995).

3 See also: Greenbaum *et al.* (1989), Angelini *et al.* (1998), Weinstein and Yafeh (1998), Von Thadden (2004), Dong and Guo (2011), Saunders and Steffen (2011).

4 Sharpe (1990) assumed that "held-up" companies are not able to change their situation in the future and have to remain in their toxic relationships. This was questioned by Von Thadden (2004), who claims that only partial informational capture is possible, since all participants of the market game observe each other and may learn which of the borrowers are trustworthy, and which bear a higher level of risk. Schenone (2009) noticed that these spillover effects mentioned by Von Thadden (2004) are likely to be observed when the company releases its initial public offer.

To verify the "hold-up" hypothesis, it is examined whether borrowers' financial costs increase as their relationships progress. We study a random sample of Polish SMEs within the period 2006–2015 deploying panel regression models. The data used in the analysis were extracted from the Bureau van Dijk's Amadeus database and supplemented with a survey conducted among sample firms.

As some studies suggest, a borrower may avoid being "locked in" by engaging in multiple relationships. For this reason, this paper also analyses whether it is true that companies borrowing from more than one relationship lender are less likely to suffer from increasing cost of debt.

The findings of this study contradict the existence of the so-called "hold-up problem" among Polish SMEs. Not only do we find that financial costs do not increase with the length of the relationship, but they tend to decrease. This evidence does not support the theory developed by Sharpe (1990) and Rajan (1992). Significant improvements in financing conditions seem to corroborate the positive impact of relationships, as suggested by Boot and Thakor (1992) and Boot (2000). Furthermore, it is found that the increasing number of banking relationships positively affects the cost of capital for the borrower. This is consistent with the findings of, *e.g.*, D'Auria *et al*. (1999).

This paper contributes to the existing literature in two ways. Firstly, the existing literature has not been able to reach consensus as to whether banking relationships have a positive or negative impact on a borrower's credit cost. This study is another attempt to answer this question, based on unique empirical evidence. Secondly, Poland, as well as other countries of Central and Eastern Europe (CEE countries), has rarely been the subject of detailed studies on lender-borrower relationships and the problems that they present; therefore, there is still a substantial gap in our knowledge. We are still not certain of how such proximity works in younger free-market economies and whether the companies are able to avoid the problems that seem to affect their foreign counterparts.

The remainder of this paper is organised as follows: In Section 2, we review the existing literature concerning bank-firm relationships and their influence on credit costs. We refer to existing studies to formulate our hypotheses. In Section 3, we present data, variables and methodology used in our analysis. Section 4 describes the empirical results and the limitations of our analysis. In Section 5, we provide concluding remarks and discuss implications of the results.

2. Existing Literature and Hypotheses

There exist two theoretical approaches to the problem of how banking relationships affect interest rates paid by a borrower. First, relationships help overcome asymmetric information between lender and borrower. In relationship banking, the borrower is more likely to reveal information than in transaction-oriented banking, for it is assumed that this information will not spill over to competitors. On the other hand, the lender, with the objective of longer cooperation in mind, has stronger incentives to gather such information. This improved information flow and the increasing amount of knowledge acquired by the bank may substantially reduce the costs of screening and monitoring,

and it will be able to offer products to its relationship borrower at lower prices (Boot and Thakor, 1994; Petersen and Rajan, 1995; Boot, 2000). According to this theory, banking relationships are beneficial for both the borrower (who is offered cheaper products) and the lender (who benefits from reduced costs for gathering and evaluating information).

Studies exist that support this theory with empirical evidence. For example, Berger and Udell (1995) show that in the United States interest rates exhibit the tendency to decrease throughout the duration of the relationship. Other studies corroborating this phenomenon in Europe include Lehmann and Neuberger (2001), Peltoniemi (2007), and Bonini *et al.* (2016).

A second strand of literature developed by, inter alia, Greenbaum *et al.* (1989), Sharpe (1990) and Rajan (1992) suggests the existence of a "hold-up problem". Relationships are believed to have a negative impact on the borrower's financial condition because of growing information asymmetry between the relationship lender and outside banks. Borrowing from non-relationship banks becomes impossible, since it is assumed that if a relationship lender has not granted financing, a company's investment is probably unlikely to succeed. Even if the data provided by a company indicate that the project will be profitable, outside banks suspect that due to factors that they are unaware of, it will result in disappointment. Therefore, the company becomes "locked" into the existing relationship and forced to buy products only from its current lender, who may from now on enforce higher interest rates. As opposed to the aforementioned theory (Boot and Thakor, 1994; Boot, 2000), it is now only the lender who benefits from the banking relationship. Companies that suffer from being informationally captured pay higher interest rates as the relationship progresses.

Weinstein and Yafeh (1998) support this theory with empirical evidence derived from a study of Japanese firms. Similar conclusions were reached for Belgium (Degryse and Van Cayseele, 2000; Degryse and Ongena, 2005), for the United Kingdom (Saunders and Steffen, 2011; Mattes *et al*., 2012), and for Italy (Pozzolo, 2004). Moreover, Angelini *et al.* (1998) demonstrate that in Italy, only companies that borrow from banks other than CCBs (local cooperative banks) are subject to higher interest rates. This may be due to CCBs' cooperative structure and the fact that they grant loans mainly to small local businesses. Furthermore, Ioannidou and Ongena (2010) suggest that in Bolivia, banks tend to increase interest rates for current borrowers in order to offer discounts for new clients. Thus, in this case, the difference in prices is even greater. On the other hand, Elsas and Krahnen (1998) find that in Germany, cost of capital is unaffected by the nature of the borrower-lender relationship.

However, for the economies where the banking sector has the dominant position as a source of capital (*e.g.*, Belgium, Italy, Japan), the empirical results generally suggest the existence of the "hold-up problem". The Polish SME sector shares such characteristics (the use of alternative banking forms of financing still remains a rare phenomenon), hence we expect the "hold-up problem" to be present in any given sample. Therefore, we formulate H_1.

H_1: As the banking relationship progresses, loan costs paid by the borrower increase.

Complementary to the abovementioned studies is another strand of literature suggesting that firms engaged in more than one banking relationship are less likely to become "locked in" and, thus, do not suffer the increasing interest costs. Multiple relationships are supposed to induce healthy competition among relationship lenders and suppress the urge to extract higher rates (Detragiache *et al*., 2000; Farinha and Santos, 2002; Guiso and Minetti, 2010; Zhang *et al*., 2016).

The aforementioned theory finds empirical evidence in the works of Ioannidou and Ongena (2010) and D'Auria *et al.* (1999), who show that firms with fewer relationships have to pay higher interest rates than their competitors cooperating with a higher number of banks.

On the other hand, Petersen and Rajan (1994) in their seminal work prove that small companies in the US have to pay higher interest rates if they engage in more than one banking relationship. They question the assumption that competition among lenders mitigates the "hold-up problem", and shows that it prevents them from reducing prices. If a company has more than one relationship, lenders have fewer incentives to produce information due to the perspective of fierce competition in the future. The borrower is, therefore, not offered any preferential treatment. Similar results have been reached by Bonfim *et al.* (2018) for Portugal.

The above reviewed studies lead to the following H_2.

H_2: Loan costs paid by the borrower decrease with the number of banking relationships.

3. Data and Methodology

To test H_1 and H_2, we constructed an unbalanced panel using a random sample of SMEs headquartered in Poland. The sample covers the period 2006–2015. The financial data were extracted from the Bureau van Dijk's Amadeus database. The relationship-specific data were gathered in a survey conducted between June and September 2017. The survey was conducted either online or via telephone, depending on the interviewee's preferences. The sample of surveyed firms was drawn randomly from the Amadeus database. The sampling process was approached in the following manner. First, we filtered the data so they exclusively included companies that were active in 2015 and had financial data available for at least six years of the studied period. Second, we excluded enterprises that did not comply with the criteria for SMEs provided by the European Commission (2003)[5]. Third, from the initial number of entities that met these conditions (26,411 companies), a random sample of 1,000 enterprises was drawn. It included: 248 micro, 545 small and 207 medium-sized companies. On average, the sample companies employed nearly 44 persons (with the minimum of 1 person employed and maximum of 240).

5 SMEs are defined as companies that employ less than 250 persons, and their annual turnover does not exceed EUR 50 million and/or their annual balance sheet does not exceed EUR 43 million (European Commission, 2003).

Table 1 | Sample companies and the population of SMEs in Poland (comparison)

	Sample companies (% share)	Population of companies in Poland (% share)
Company size		
Micro	24.80	95.78
Small	54.50	3.52
Medium	20.70	0.70
Legal form[6]		
Cooperative company	4.55	0.47
General partnership	17.29	7.86
Joint stock company	2.83	2.49
Limited liability company	70.07	83.69
Limited partnership	5.26	5.49
Region (Voivodeship)		
Lower Silesia (Polish: *dolnośląskie*)	11.00	8.54
Kuyavia-Pomerania (*kujawsko-pomorskie*)	5.00	4.62
Lublin (*lubelskie*)	3.90	4.14
Lubusz (*lubuskie*)	3.10	2.66
Łódź (*łódzkie*)	3.90	5.77
Lesser Poland (*małopolskie*)	8.80	8.70
Mazovia (*mazowieckie*)	17.30	18.30
Opole (*opolskie*)	3.50	2.40
Subcarpathia (*podkarpackie*)	2.00	3.95
Podlaskie	3.20	2.37
Pomerania (*pomorskie*)	10.60	6.74
Silesia (*śląskie*)	6.50	11.13
Holy Cross (*świętokrzyskie*)	2.00	2.64
Warmia-Masuria (*warmińsko-mazurskie*)	4.00	2.96
Greater Poland (*wielkopolskie*)	10.70	9.80
West Pomerania (*zachodniopomorskie*)	4.50	5.28

Source: Author's data; GUS, 2016[6]

6 Due to data unavailability, the sample is compared to the entire population of enterprises in Poland, *i.e.*, also including companies that employ 250 or more persons.

Table 1 presents a comparison between the sample and the population of SMEs in Poland in the year 2015 based on their size, legal form and region (voivodeship[7]) where they were headquartered. Unfortunately, due to data unavailability SMEs in the population are defined solely on the basis of their employment level, and therefore it is possible that some companies may not have met the criteria for SMEs defined by the European Commission (2003). Most of the entities in the sample were small-sized companies, while the vast majority of SMEs in Poland were micro-sized companies. Such disparity is mainly due to the fact that there are no available financial data concerning the smallest enterprises. Most of the companies in both the sample and the population operated as limited liability companies. Other legal forms were relatively rare. In both groups, the highest share of entities were registered in the Mazovian voivodeship, which is the largest, the most populous and the most economically developed region of Poland.

The sample companies were provided with the same set of questions regarding their banking relationships (such as number of relationships, length and exclusivity of each relationship). A total of 315 companies took part in the survey. 161 SMEs (51.11%) declared that they were engaged in banking relationships during the given period. These firms constitute the basis of the present study.

We use the financial expenditures to total liabilities ratio of the company *i* in the year *t* as the dependent variable. Unfortunately, we were unable to isolate the interest costs for the given sample. However, it can be assumed that the interest costs constitute a majority of the companies' total financial expenditures. In the case of Polish SMEs, other means of external financing are still rarely encountered[8].

To test the hypotheses, we defined two relationship-specific variables: *Rel_no* and *Rel_length*. *Rel_no* illustrates the number of banking relationships of the company *i* in the year *t*. We measure the length of the banking relationship (*Rel_length*) in a manner similar to Guiso and Minetti (2010), using the average length of relationships that the company *i* has in the year *t*. However, we applied the average weighted by each relationship bank's share in the company's total liabilities (relationship exclusivity).

The generalised model that is used to evaluate the relation between the dependent variable and other variables takes following form:

$$Fin\_expenditures_{i,t} = \beta_0 + \beta_1 C_{i,t} + \beta_2 R_{i,t} + \beta_3 M_{i,t} + \beta_4 I_{i,t} \quad (1)$$

where the dependent variable is the financial expenditures to total liabilities ratio of the company *i* in the year *t*; $C_{i,t}$ is a set of variables controlling for the different characteristics of companies included in our sample and $R_{i,t}$ represents variables related to banking relationships of a given company. $M_{i,t}$ refers to the variable controlling for the macroeconomic situation in the year *t* (central bank interest rate). $I_{i,t}$ stands for industry dummies.

7 Voivodeships (Polish: województwa) are the highest-level administrative divisions of Poland.

8 SMEs in Poland rarely operate activities that may lead to kinds of financial expenditures other than those regarding bank loans. Thus, we assume that our dependent variable is sufficient in the analysis of the aforementioned problems.

Table 2 presents descriptions of the variables and expected signs of the relevant coefficients. We measure the size of the company (*Size*) as a natural logarithm of its total assets. It is expected to indicate a negative correlation with the dependent variable, since larger companies are generally considered to be less risky. A similar relation is predicted with regard to *Age* (years elapsed since a company's establishment). Firms that are better established on the market should bear a lower level of risk, and be offered loans at lower prices. *Profitability* (measured with earnings before interest and taxes to sales ratio) indicates a company's financial well-being and, thus, we predict a negative correlation. We deploy the total asset turnover (TAT) as a measure which shows how efficiently assets are used in generating a firm's profits (*Assets_efficiency*). We expect a negative sign. *Equity* (equity to total assets ratio) depicts to what degree a company is financed with equity. Companies with a lower level of this indicator may be burdened with excessive debt. This results in concerns about their solvency and, ergo, a higher cost of capital. Therefore, a negative sign is anticipated. *Cash* (cash and equivalents to current assets ratio) is expected to adversely affect the dependent variable, since companies with higher levels of cash are less likely to suffer cash flow problems due to payment delays. *Fixed_assets* (fixed assets to total assets ratio) is presumed to have a negative correlation. Firms with a larger share of fixed assets in total assets may provide sufficient collateral for their debt more easily.

Table 2 | Variable descriptions

Variable	Description	Source	Expected sign of coefficient
Fin_expenditures	Financial expenditures to total liabilities ratio	Amadeus	
Size	Natural logarithm of company total assets, deflated by the consumer price index (CPI)	Amadeus	–
Age	Time period between a given year and year of company's establishment (in years)	Amadeus	–
Profitability	EBIT to sales ratio	Amadeus	–
Assets_efficiency	TAT (sales to total assets ratio)	Amadeus	–
Equity	Total equity to total assets ratio	Amadeus	–
Cash	Cash and cash equivalents to current assets ratio	Amadeus	–
Fixed_assets	Fixed assets to total assets ratio	Amadeus	–
Rel_no	Number of company's banking relationships	Survey	–
Rel_length	Average length of company's banking relationships	Survey	+

Source: Author's data

Finally, we include two experimental variables to test H_1 and H_1. *Rel_no* (the number of a company's banking relationships) is expected to have a negative correlation with the dependent variable. This will support H_2. *Rel_length* indicates the average length of banking relationships of a firm in a given year. The positive sign of a coefficient will provide evidence in favour of H_1.

Table 3 presents descriptive statistics for the main variables deployed in the following empirical models. The data exhibit significant variability. A substantial level of variability is observable in the *Profitability* variable.

SMEs included in the dataset are mostly engaged in one or two banking relationships. A higher number of relationships is a relatively rare phenomenon. In this regard, Polish companies resemble their counterparts headquartered in Belgium (Degryse and Van Cayseele, 2000), Germany (Harhoff and Körting, 1998; Memmel *et al*., 2007), Norway (Degryse and Ongena, 2001) and Portugal (Farinha and Santos, 2002). In one of the rare studies regarding CEE countries, Geršl and Jakubík (2016) find that having a larger number of lenders is rare among Czech companies. However, in contrast to Polish SMEs, the vast majority of firms located in the Czech Republic (over 80%) have only one lending relationship.

Table 3 | Descriptive statistics of the analysed sample

Variable	Mean	Median	Std. Dev.	10th Perc.	90th Perc.	Obs.
Fin_expenditures	0.0486	0.0324	0.0622	0.0084	0.0990	1,239
Size	15.1844	15.0765	1.3748	13.4324	16.9265	1,322
Age	15.5428	14.0000	12.2001	5.0000	24.0000	1,322
Profitability	0.0495	0.0421	0.1315	−0.0166	0.1443	1,308
Assets_efficiency	2.1820	1.8505	1.4313	0.7007	4.2956	1,322
Equity	0.4443	0.4509	0.2623	0.1277	0.7838	1,322
Cash	0.1330	0.0678	0.1653	0.0050	0.3662	1,287
Fixed_assets	0.3538	0.3150	0.2506	0.0481	0.7045	1,322
Rel_no	1.6291	1.0000	0.7870	1.0000	3.0000	1,322
Rel_length	10.4976	10.0000	6.5938	2.0000	19.8400	1,128

Source: Author's calculations

Our data contradicts Ongena and Smith (2000), who show that the mean for the number of relationships in Poland is 3.3 and almost 80% of companies have 3 or more banking relationships. A possible explanation for this disparity is that our data set consists of a larger number of entities (159 unique records instead of just 13) and is strictly focused on the SME sector.

Our data document that relationships longer than 20 years rarely occur. This is mainly due to the short history of a market economy in contemporary Poland. The number

of companies that existed before the economic transition of the early 1990s, especially in the case of SMEs, is quite small (see descriptive statistics for *Age*). The average length of a banking relationship in our sample (10.5 years) is, however, similar to the average length observed in other countries (Angelini *et al*., 1998; Bonini *et al*., 2016) or even longer (Ongena and Smith, 2001; Farinha and Santos, 2002; Degryse and Ongena, 2005; Santikian, 2014).

4. Empirical Results

4.1 Univariate evidence

Table 4 presents the results of the t-test for differences in means between SMEs engaged in single and multiple banking relationships. We find that these differences in the case of most of the variables are statistically significant. *Profitability*, *Equity* and *Fixed_assets* constitute exceptions to this rule. As H_2 suggests, companies with multiple relationships have a lower value of financial expenditures to total liabilities ratio (significant at the 5% level). This difference is, however, rather small (0.0083). This may suggest that in the following regression models, *Rel_no* may be negatively correlated with *Fin_expenditures*. Differences in means for *Size* and *Age* seem to prove the theory that larger and better-established companies engage in multiple relationships (Farinha and Santos, 2002). The average length of a relationship for single-relationship companies is relatively higher (1.7843 years), as is in the findings of Ongena and Smith (2001). However, due to the simplistic nature of this test, drawing any decisive conclusions is not recommended. Further evidence will be provided based on the results of the regression models.

Table 4 | Test for differences in means between companies with single and multiple banking relationships

Variable	Single relationship		Multiple relationships			
	Mean	Obs.	Mean	Obs.	Difference	*t*-value
Fin_expenditures	0.0524	671	0.0441	567	0.0083	1.9618**
Size	14.6491	724	15.8334	597	–1.1843	1.9619***
Age	14.2403	724	17.1223	597	–2.8819	1.9627***
Profitability	0.0449	717	0.0550	590	–0.0100	1.9618
Assets_efficiency	2.3409	724	1.9894	597	0.3516	1.9617***
Equity	0.4527	724	0.4341	597	0.0186	1.9617
Cash	0.1525	694	0.1101	592	0.0424	1.9618***
Fixed_assets	0.3489	724	0.3597	597	–0.0108	1.9617
Rel_length	11.3446	592	9.5603	535	1.7843	1.9620***

Note: ***, **, * denote statistical significance at levels of 1%, 5% and 10%, respectively.
Source: Author's calculations

Table 5 documents how the variables are affected by the length of banking relationships. As before, we run the *t*-test for differences in means between companies with shorter and longer relationships. By "short relationship", we refer to relationships shorter than 10 years and by "long relationship", we refer to relationships that have lasted for at least 10 years.

We find that for the majority of the variables, differences in means are statistically significant. Consistent with the findings of Ongena and Smith (2001), companies that have higher profitability ratios, better asset management and depend on a lower degree of equity (variables: *Profitability*, *Assets_efficiency* and *Equity*, respectively) have, on average, shorter banking relationships. *Fix_expenditures* does not differ significantly. This may lead to the question whether the length of a banking relationship affects the cost of capital, as H_1 conjectures. It will be analysed in the following regression models.

Table 5 | Test for differences in means between companies with short and long banking relationships

Variable	Short relationships		Long relationships			
	Mean	Obs.	Mean	Obs.	Difference	*t*-value
Fin_expenditures	0.0492	556	0.0487	512	0.0004	1.9622
Size	15.2523	593	15.2740	534	−0.0216	1.9621
Age	10.7521	593	22.6554	534	−11.9033	1.9626***
Profitability	0.0494	588	0.0429	532	0.0065	1.9621***
Assets_efficiency	2.3348	593	1.9790	534	0.3557	1.9621***
Equity	0.4209	593	0.4706	534	−0.0497	1.9621***
Cash	0.1326	581	0.1197	519	0.0130	1.9621
Fixed_assets	0.3446	593	0.3760	534	−0.0314	1.9621**
Rel_no	1.7437	593	1.5730	534	0.1706	1.9620***

Note: ***, **, * denote statistical significance at levels of 1%, 5% and 10%, respectively.

Source: Author's calculations

4.2 Multivariate evidence

As well as the univariate tests, we provide multivariate evidence from the GLS (generalised least squares) random effects panel regressions. We start our analysis by developing a model which includes only variables controlling for companies' characteristics and omits variables referring to banking relationships (Model 1). Relationship-specific variables are included in Model 2 (*Rel_no*), Model 3 (*Rel_length*) and Model 4 (both *Rel_no* and *Rel_length*).

Table 6 shows the results. In Model 2, we find that the number of relationships does not have a statistically significant impact on the dependent variable, which leads

to the conclusion that this variable does not affect the financial costs of Polish SMEs. However, in Model 4 (which includes both relationship-specific variables) *Rel_no* shows a weak negative correlation (significant at the 10% level) and supports H_2. Model 4 indicates that every additional relationship leads to a drop in *Fin_expenditures* by 0.0087. Bearing in mind the mean value of *Fin_expenditures* (0.0486), this change is rather considerable. Disparities in the results of Model 2 and Model 4 are probably due to the differences in the samples used in the models. The sample in Model 4 is more restricted than it is in Model 2.

The results of Model 4 are consistent with the findings of D'Auria *et al* (1999), Ioannidou and Ongena (2010). Both Model 4 and the t-test for differences in means (Table 4) contradict Petersen and Rajan (1994) and Bonfim *et al*. (2018), who claim that companies from the SME sector find it more costly to maintain more than one banking relationship.

Model 3 and Model 4 show that *Rel_length* is negatively correlated with the dependent variable. Coefficients indicate that for every additional year of a relationship, *Fin_expenditures* is expected to fall by 0.0011 (Model 3) or 0.0012 (Model 4). The results of both models do not differ greatly. The drop in the value of the dependent variable is also lower than it is in the case of *Rel_no*. Correlations are significant at the 10% level (Model 3) and at the 5% level (Model 4). These findings do not support H_1. According to our data, the longer the relationship, the more benefits it generates for the company. This is inconsistent with the "hold-up problem" theory proposed by Sharpe (1990) and Rajan (1992), as well as with the empirical results from Belgium (Degryse and Van Cayseele, 2000; Degryse and Ongena, 2005), Italy (Angelini *et al*., 1998; Pozzolo, 2004), Japan (Weinstein and Yafeh, 1998) and the United Kingdom (Saunders and Steffen, 2011; Mattes *et al*., 2012). Our findings seem to support the theory developed by Boot and Thakor (1994) and Boot (2000), which suggests that thanks to the gradual overcoming of information asymmetry between both sides, the borrower is offered capital at a decreased price.

Our findings that both *Rel_no* and *Rel_length* are negatively correlated with the dependent variable suggest the possibility that Polish SMEs avoid being "held-up" (negative correlation of *Rel_length*) by engaging in multiple relationships (negative correlation of *Rel_no*).

Contradictory to the previous research, we find that the size and age of a company do not have a significant impact on companies' cost of debt for enterprises in banking relationships. These results repeat in all the models. Neither do the variables *Cash* and *Fixed_assets* indicate any statistically significant correlations with the dependent variable.

As has been predicted (Table 2), we find negative correlations between *Fin_expenditures* and the variables *Assets_efficiency* (significant at the 1% level) and *Equity* (significant at the 5% level) in every model considered. The results differ between models only in how large the fall of *Fin_expenditures* is with the increase of these variables. *Assets_efficiency* presents the most visible change in Model 3 (−0.0065), while *Equity in* Model 4 (−0.0273). Companies with a better asset turnover ratio (*Assets_efficiency*), as well as those financed mainly with their shareholders' funds (*Equity*), are considered less risky by their lenders and, thus, enjoy a decreased cost of capital. We expected a negative correlation in the case of companies' profitability ratio. Paradoxically, it is found that more profitable firms show

higher values of the dependent variable. The values of the coefficients amount to 0.0369 (Model 1), 0.0370 (Model 2), 0.0471 (Model 3) and 0.0476 (Model 4). These results are statistically significant at the 5% level in every model considered.

This raises the question what may be the reason for these results. One probable explanation is the existence of the "hold-up problem", where companies are forced to pay higher interest rates. This is, however, inconsistent with the results of Model 3 and Model 4 (regarding *Rel_length*). The second possibility is that more profitable firms engage in a larger number of risk-bearing investments in order to accelerate their growth and expansion rather than just focus on maintaining their current market position (riskier investments are usually considered more profitable).

Table 6 | Determinants of financial costs of SMEs in banking relationships

Variable	Model 1	Model 2	Model 3	Model 4
$Size_{t-1}$	−0.0008 (−0.33)	0.0007 (0.28)	−0.0014 (−0.56)	0.0007 (0.27)
Age_{t-1}	0.0000 (0.11)	0.0000 (0.13)	0.0004 (1.24)	0.0005 (1.38)
$Profitability_{t-1}$	0.0369** (2.03)	0.0370** (2.04)	0.0471** (2.37)	0.0476** (2.40)
$Assets\_efficiency_{t-1}$	−0.0055*** (−2.81)	−0.0054*** (−2.78)	−0.0065*** (−3.08)	−0.0064*** (−3.02)
$Equity_{t-1}$	−0.0251** (−2.31)	−0.0258** (−2.37)	−0.0262** (−2.25)	−0.0273** (−2.35)
$Cash_{t-1}$	0.0154 (1.09)	0.0153 (1.09)	0.0217 (1.39)	0.0213 (1.37)
$Fixed\_assets_{t-1}$	−0.0021 (−0.18)	−0.0026 (−0.23)	−0.0008 (−0.06)	−0.0017 (−0.14)
Rel_no	– –	−0.0064 (−1.34)	– –	−0.0087* (−1.70)
Rel_length	– –	– –	−0.0011* (−1.95)	−0.0012** (−2.17)
Int_rate_{t-1}	0.7424*** (4.20)	0.7490*** (4.24)	0.6843*** (3.45)	0.6812*** (3.44)
Industry dummies	YES	YES	YES	YES
Observations	1,057	1,057	930	930
R^2	0.0368	0.0384	0.0491	0.0521

Note: The table reports the coefficient estimates from GLS random effects panel regressions. The dependent variable in all models is financial costs to total liabilities ratio (*Fin_expenditures*). The analyses cover the period 2006–2015. *Int_rate* refers to central bank interest rate. Other independent variables are defined in Table 2. Constants are not shown. *t*-values are in parentheses.

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

Source: Author's calculations

4.3 Limitations of the study

There exist several limitations to our study that prevent an unambiguous evaluation of the analysed problems. The main limitation is the size of the sample used in the models. This was mainly due to the low response rate in the conducted survey. A larger sample should result in more accurate outcomes. Our study is also limited by the availability of financial data regarding the SME sector in Poland, particularly data from micro-sized companies. Estimations and hypothesis testing are possible only when such data are available. Therefore, it was not possible to conduct our analysis basing on the sample which would include a larger share of micro-sized entities. Moreover, in our analysis we used total financial expenditures weighted by total liabilities as the dependent variable, since we were unable to isolate interest rate costs (which would have been more accurate). It would also be advisable to analyse the problem of increasing/decreasing credit costs by supplementing companies' financial statements with the data provided by their lenders. Furthermore, the question whether there is a certain length of a relationship, or a certain number of relationships that may lead to a change in the observed trend, *i.e.*, after the given number of relationships financing conditions begin to deteriorate, has not been answered even though they were generally improving along with this variable.

5. Conclusions and Implications of the Study

This paper assessed two problems. First, we tested whether the length of banking relationships negatively affects companies' cost of credit, as suggested by the "hold-up" hypothesis (Greenbaum *et al*., 1989; Sharpe, 1990; Rajan, 1992). Existing literature indicates that the "hold-up problem" occurs in economies where companies' external financing is restricted to bank loans. Poland shares such characteristics and, therefore, the "hold-up problem" was expected to be observed among Polish enterprises. However, our analysis of a random sample of Polish SMEs shows that the length of banking relationships exhibits a negative correlation with the cost of capital. Therefore, the "hold-up problem" seems to be non-existent in this sector. Our findings support the theory which suggests that banking relationships constitute a source of benefits for the borrowing companies (Boot and Thakor, 1994; Boot, 2000). Longer relationships help overcome the information asymmetry between lender and borrower. As a result, the lender is able to offer the borrower products at lower prices.

The second issue analysed was the question whether the number of banking relationships has a beneficial impact on the price of credit. Existing literature generally supports the view that multiple banking relationships leads to healthy competition among lenders and, as a consequence, reduced credit cost. It also helps mitigate the "hold-up problem". Our findings provide evidence for this theory. Contrary to Petersen and Rajan (1994), who suggest that maintaining multiple banking relationships may be generating extra costs for smaller companies, we find that Polish SMEs engaged in multiple banking relationships enjoy a reduced cost of debt.

Negative correlations of both variables with the dependent variable also suggest that engaging in multiple banking relationships may be an efficient method to mitigate the "hold-up problem". It is possible that the beneficial influence of relationship length has been caused by the fact that companies engaged in more than one relationship have become less exposed to the threat of being informationally captured. However, a complete picture of the situation may only be achieved if further analysis is conducted.

We believe that our results convey important implications for stakeholders of Polish SMEs. First, as we find that companies engaged in banking relationships do not suffer from the "hold-up problem" and such close cooperation is beneficial, it is advisable for owners/managers of SMEs in Poland to use this form of banking. These benefits are also visible in multiple relationships. Companies may establish more than one relationship if required (because of, *e.g.*, larger capital demand) without worrying about losing the benefits from the current relationship. Furthermore, the company's improved situation might translate into benefits for other groups of stakeholders. Local communities may be considered as one group of stakeholders who may benefit from the profits of SMEs generated in banking relationships. Many Polish SMEs (especially smaller entities) operate only locally and employ local workers. Their growth is essential for the communities in which they operate. If local SMEs suffer from financial constraints or an excessive financial burden, this also affects the whole community (*e.g.*, redundancies, a lower level of investment). Furthermore, SMEs constitute 99.8% of all firms in Poland and employ 70% of the workforce for non-financial enterprises (GUS, 2015). SMEs create nearly half of the Polish GDP (PARP, 2016). For this reason, SMEs play a crucial role for the whole economy. Due to their significance in creating jobs and generating the country's GDP, the success of SMEs is also important for the public authorities. Public agencies responsible for fostering entrepreneurship should consider promoting relationship banking as a beneficial form of financing companies' activities.

References

Angelini, P., Di Salvo, R., Ferri, G. (1998). Availability and Cost of Credit for Small Businesses: Customer Relationships and Credit Cooperatives. *Journal of Banking & Finance*, 22(6–8), 925–954, https://doi.org/10.1016/s0378-4266(98)00008-9

Bateman, M. (2000). Neo-Liberalism, SME Development and the Role of Business Support Centres in the Transition Economies of Central and Eastern Europe. *Small Business Economics*, 14(4), 275–298, https://doi.org/10.1023/A:1008170805013

Berger, A. N., Udell, G. F. (1995). Relationship Lending and Lines of Credit in Small Firm Finance. *The Journal of Business*, 68(3), 351–381, https://doi.org/10.1086/296668

Bonfim, D., Dai, Q., Franco, F. (2018). The Number of Bank Relationships and Borrowing Costs: The Role of Information Asymmetries. *Journal of Empirical Finance*, 46, 191–209, https://doi.org/10.1016/j.jempfin.2017.12.005

Bonini, S., Dell'Acqua, A., Fungo, M., Kysucky, V. (2016). Credit Market Concentration, Relationship Lending and the Cost of Debt. *International Review of Financial Analysis*, 45, 172–179, https://doi.org/10.1016/j.irfa.2016.03.013

Boot, A. W. A. (2000). Relationship Banking: What Do We Know? *Journal of Financial Intermediation*, 9(1), 7–25, https://doi.org/10.1006/jfin.2000.0282

Boot, A. W. A., Thakor, A. V. (1994). Moral Hazard and Secured Lending in an Infinitely Repeated Credit Market Game. *International Economic Review*, 35(4), 899–920, https://doi.org/10.2307/2527003

Cenni, S., Monferrà, S., Salotti, V., Sangiorgi, M., Torluccio, G. (2015). Credit Rationing and Relationship Lending. Does Firm Size Matter? *Journal of Banking & Finance*, 53, 249–265, https://doi.org/10.1016/j.jbankfin.2014.12.010

D'Auria, C., Foglia, A., Reedtz, P. M. (1999). Bank Interest Rates and Credit Relationships in Italy. *Journal of Banking & Finance*, 23(7), 1067–1093, https://doi.org/10.1016/s0378-4266(98)00131-9

Degryse, H., Ongena, S. (2001). Bank Relationships and Firm Profitability. *Financial Management*, 30(1), 9–34, https://doi.org/10.2307/3666389

Degryse, H., Ongena, S. (2005). Distance, Lending Relationships, and Competition. *The Journal of Finance*, 60(1), 231–266, https://doi.org/10.1111/j.1540-6261.2005.00729.x

Degryse, H., Van Cayseele, P. (2000). Relationship Lending within a Bank-Based System: Evidence from European Small Business Data. *Journal of Financial Intermediation*, 9(1), 90–109, https://doi.org/10.1006/jfin.1999.0278

Detragiache, E., Garella, P., Guiso, L. (2000). Multiple versus Single Banking Relationships: Theory and Evidence. *The Journal of Finance*, 55(3), 1133–1161, https://doi.org/10.1111/0022-1082.00243

Dong, B., Guo, G. (2011). The Relationship Banking Paradox: No pain no Gain versus Raison D'être. *Economic Modelling*, 28(5), 2263–2270, https://doi.org/10.1016/j.econmod.2011.06.009

Elsas, R., Krahnen, J. P. (1998). Is Relationship Lending Special? Evidence from Credit-File Data in Germany. *Journal of Banking & Finance*, 22(10–11), 1283–1316, https://doi.org/10.1016/s0378-4266(98)00063-6

European Commission (2003). *Commission Recommendation Concerning the Definition of Micro, Small and Medium-sized Companies*, May, 6.

Farinha, L. A., Santos, J. A. C. (2002). Switching from Single to Multiple Bank Lending Relationships: Determinants and Implications. *Journal of Financial Intermediation*, 11(2), 124–151, https://doi.org/10.1006/jfin.2001.0328

Geršl, A., Jakubík, P. (2016). Relationship Lending in Emerging Markets: Evidence from the Czech Republic. *Global Banking Crises and Emerging Markets*, 75–97, https://doi.org/10.1007/978-1-137-56905-9_5

GUS (2015). *Small and medium non-financial enterprises in Poland 2009-2013*. Warszawa: Statistics Poland.

GUS (2016). *Structural changes of groups of the national economy entities in the REGON register, 2015*. Warszawa: Statistics Poland.

Greenbaum, S. I., Kanatas, G., Venezia, I. (1989). Equilibrium Loan Pricing under the Bank-client Relationship. *Journal of Banking & Finance*, 13(2), 221–235, https://doi.org/10.1016/0378-4266(89)90061-7

Guiso, L., Minetti, R. (2010). The Structure of Multiple Credit Relationships: Evidence from U.S. Firms. *Journal of Money, Credit and Banking*, 42(6), 1037–1071, https://doi.org/10.1111/j.1538-4616.2010.00319.x

Harhoff, D., Körting, T. (1998). Lending Relationships in Germany – Empirical Evidence from Survey Data. *Journal of Banking & Finance*, 22(10–11), 1317–1353, https://doi.org/10.1016/s0378-4266(98)00061-2

Hasan, I., Jackowicz, K., Kowalewski, O., Kozłowski, Ł. (2017). Do Local Banking Market Structures Matter for SME Financing and Performance? New Evidence from an Emerging Economy. *Journal of Banking & Finance*, 79, 142–158, https://doi.org/10.1016/j.jbankfin.2017.03.009

Hoshi, T., Kashyap, A., Loveman, G. (1995). Financial System Reform in Poland: Lessons from Japan's Main Bank System, in Aoki, M., Patrick, H., eds., *The Japanese Main Bank System*. Oxford: Oxford University Press, pp. 592–634, https://doi.org/10.1093/0198288999.003.0017

Ioannidou, V., Ongena, S. (2010). "Time for a Change": Loan Conditions and Bank Behavior when Firms Switch Banks. *The Journal of Finance*, 65(5), 1847–1877, https://doi.org/10.1111/j.1540-6261.2010.01596.x

Iwanicz-Drozdowska, M., Jackowicz, K., Kozłowski, Ł. (2018). SMEs' Near-Death Experiences. Do Local Banks Extend a Helping Hand? *Emerging Markets Review*, 37, 47–65, https://doi.org/10.1016/j.ememar.2018.05.004

Lehmann, E., Neuberger, D. (2001). Do Lending Relationships Matter? Evidence from Bank Survey in Germany. *Journal of Economic Behavior & Organization*, 45(4), 339–359, https://doi.org/10.1016/s0167-2681(01)00151-2

Mattes, J. A., Steffen, S., Wahrenburg, M. (2012). Do Information Rents in Loan Spreads Persist over the Business Cycles? *Journal of Financial Services Research*, 43(2), 175–195, https://doi.org/10.1007/s10693-012-0129-z

Memmel, C., Schmieder, C., Stein, I. (2007). *Relationship Lending – Empirical Evidence for Germany*. Deutsche Bundesbank Discussion Paper 14/2007.

Ongena, S., Smith, D. C. (2000). What Determines the Number of Bank Relationships? Cross-Country Evidence. *Journal of Financial Intermediation*, 9(1), 26–56, https://doi.org/10.1006/jfin.1999.0273

Ongena, S., Smith, D. C. (2001). The Duration of Bank Relationships. *Journal of Financial Economics*, 61(3), 449–475, https://doi.org/10.1016/s0304-405x(01)00069-1

PARP (2016). *Report on the Condition of SME Sector in Poland*. Warszawa: Polish Agency for Enterprise Development.

Peltoniemi, J. (2007). The Benefits of Relationship Banking: Evidence from Small Business Financing in Finland. *Journal of Financial Services Research*, 31(2–3), 153–171, https://doi.org/10.1007/s10693-007-0009-0

Petersen, M. A., Rajan, R. G. (1994). The Benefits of Lending Relationships: Evidence from Small Business Data. *The Journal of Finance*, 49(1), 3–37, https://doi.org/10.1111/j.1540-6261.1994.tb04418.x

Petersen, M. A., Rajan, R. G. (1995). The Effect of Credit Market Competition on Lending Relationships. *The Quarterly Journal of Economics*, 110(2), 407–443, https://doi.org/10.2307/2118445

Pozzolo, A. F. (2004). *The Role of Guarantees in Bank Lending*. EFMA 2004. Basel Meetings Paper, https://doi.org/10.2139/ssrn.498982

Rajan, R. G. (1992). Insiders and Outsiders: The Choice between Informed and Arm's-Length Debt. *The Journal of Finance*, 47, 1367–1400, https://doi.org/10.1111/j.1540-6261.1992.tb04662.x

Santikian, L. (2014). The Ties that Bind: Bank Relationships and Small Business Lending. *Journal of Financial Intermediation*, 23(2), 177–213, https://doi.org/10.1016/j.jfi.2013.11.004

Saunders, A., Steffen, S. (2011). The Costs of Being Private: Evidence from the Loan Market. *Review of Financial Studies*, 24(12), 4091–4122, https://doi.org/10.1093/rfs/hhr083

Schenone, C. (2009). Lending Relationships and Information Rents: Do Banks Exploit Their Information Advantages? *Review of Financial Studies*, 23(3), 1149–1199, https://doi.org/10.1093/rfs/hhp080

Sharpe, S. A. (1990). Asymmetric Information, Bank Lending, and Implicit Contracts: A Stylized Model of Customer Relationships. *The Journal of Finance*, 45(4), 1069–1087, https://doi.org/10.1111/j.1540-6261.1990.tb02427.x

Słomka-Gołębiowska, A., Urbanek, P. (2016). Corporate Boards, Large Blockholders and Executive Compensation in Banks: Evidence from Poland. *Emerging Markets Review*, 28, 203–220, https://doi.org/10.1016/j.ememar.2016.08.001

Von Thadden, E. L. (2004). Asymmetric Information, Bank Lending and Implicit Contracts: the Winner's Curse. *Finance Research Letters*, 1(1), 11–23, https://doi.org/10.1016/S1544-6123(03)00006-0.

Weinstein, D. E., Yafeh, Y. (1998). On the Costs of a Bank-Centered Financial System: Evidence from the Changing Main Bank Relations in Japan. *The Journal of Finance*, 53(2), 635–672, https://doi.org/10.1111/0022-1082.254893

Zhang, X., Song, Z., Zhong, Z. (2016). Does "Small Bank Advantage" Really Exist? Evidence from China. *International Review of Economics & Finance*, 42, 368–384, https://doi.org/10.1016/j.iref.2015.10.009