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Take it to the (public) bank: The efficiency of public bank loans to private firms

INCOMPLETE CAPITAL MARKETS and credit constraints are often considered obstacles to economic growth, thus motivating government interventions. One such intervention is governmental bank loans targeting credit-constrained small and medium-sized enterprises (SMEs). Using a unique data set, this paper contributes to the literature by studying how these loans affect the targeted firms.

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Take it to the (Public) Bank: The Efficiency of Public Bank Loans to Private Firms

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Abstract

Incomplete capital markets and credit constraints are often considered obstacles to economic growth, thus motivating government interventions in capital markets. One such intervention is governmental bank loans targeting credit-constrained small and medium-sized enterprises (SMEs). However, it is less clear to what extent these interventions result in firm growth and whether governmental loans should target firms that are not receiving private bank loans (the extensive margin) or work in conjunction with private bank loans (the intensive margin). Using a unique data set with information on state bank loans targeting credit-constrained SMEs with and without complementary private bank loans, this paper contributes to the literature by studying how these loans affect the targeted firms. The results suggest that positive effects are found on firm productivity and sales for firms with 10 or fewer employees, while no evidence is found of employment effects. This lack of employment effect suggests that a lack of external credit is not the main obstacle to SME employment growth.

Keywords: Credit constraints, Public policy, State-owned banks, SMEs, CEM, Matching, Causal treatment effect evaluation

JEL: L52, O38, H81, L26, G28

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1 Introduction

At least since Schmidt (1951), economists have studied how capital market imperfections affect small and medium-sized enterprises (SMEs) and their access to credit. There are several reasons why capital markets, especially capital markets for SMEs, should not work perfectly. These include asymmetric information between borrowers and lenders, large transaction costs in gathering information and moral hazard. These barriers, in turn, lead banks and other financial institutions to resort to rationing credit since the market price is set to a level inconsistent with market clearing. With imperfect financial markets, firms with ideas, projects and innovations with positive net present values cannot realize them because they lack access to sufficient credit to finance these projects. If firms are capital constrained, there might be room for government policies to expand access to capital and, hence, increase firm and economic growth. If, on the other hand, capital markets are somewhat efficient or governments are inefficient in allocating credit to constrained firms, then public credit risks wasting taxpayer money either by crowding-out private credit (since all worthwhile projects are already fully financed) or by investing in projects that are not worthwhile. In other words, in an inefficient equilibrium, bills are left on the sidewalk since firms have ideas that would generate profits if they were implemented, to borrow an expression from development economics (Olson, 1996). In an efficient equilibrium, all profitable ideas are realized.

To bridge the finance gap, governments in most developed countries use instruments such as direct subsidies, governmental venture capital and government-sponsored bank loans (Becker, 2015). Bank loans are often supported via credit guarantees to private banks, but they can also take the form of state-owned banks that lend directly to firms. Previous Swedish research on direct subsidies to firms has found small or no long-run effects, although the results differ (Tillväxtanalys, 2014; Söderblom et al., 2015; Gustafsson et al., 2016). Indeed, some firms seem to specialize in seeking subsidies rather than in producing (Gustafsson et al., 2017). Swedish public funding through both loans and subsidies also seems inefficient in increasing R&D (Svensson, 2007). The effects of governmental venture capital are even more ambiguous. While governmental venture capital follow private venture capital quite closely and hence makes decent profits, it also invests in more failing projects than do private venture capital firms (Engberg et al., 2017).

Unfortunately, it is quite problematic to directly determine whether public interventions are efficient. Governments are often reluctant to allocate credit, grants or similar resources randomly, which makes ex post evaluation difficult. Further, firms seek the most profitable method of financing, creating selection bias across different categories of creditors. Evaluations therefore need to use advanced econometric methods to allow for causal inference

(Klette et al., 2000; David et al., 2000). Previous research has often involved publicly traded firms since it is easier to gain access to data on these firms. At the same time, publicly traded firms are less likely to be credit constrained than private firms, which make up the bulk of all firms in an economy.

The aim of this paper is to estimate the growth effects of public loans to SMEs in Sweden. This is possible due to a unique data set of loans from the state-owned bank, Almi, along with register data on all Swedish firms, which provides a control group. These data include information on whether firms that receive a loan from Almi also received a commercial loan at the same time, as well as the size of that loan. Since Almi charges higher interest rates than other banks to allow for greater risk taking, firms that are able to obtain sufficiently large commercial bank loans have little incentive to apply for an Almi loan. This should ensure that firms that borrow from Almi are genuinely credit constrained. Most firms that receive a loan from Almi also have a commercial bank loan, with Almi's loan often representing 50 percent of the total, but some firms only have Almi loans. This makes it possible to study credit rationing on both the intensive margin and the extensive margin. The intensive margin should correspond to firms that have both commercial bank and Almi loans, whereas the extensive margin corresponds to firms that only borrow from Almi.

While there is a large body of previous research regarding credit constraints, this paper adds to the literature in several ways. First, it utilizes better data on the exact amount of lending, the interests rates paid on loans from Almi, and the extent to which firms that received loans from Almi also commercial loans. In combination with register data on all other firms in the Swedish economy, it is possible to study both private and public firms, increasing the possibility of finding firms that are credit constrained. The data include information on private firms, which are more likely to be constrained in the loan market (Saunders and Steffen, 2011). The register data match employers to employees and include firm variables such as capital stock and debt. The data on employees include information on wages and education levels. Second, previous research has suffered from a lack of a clear identification strategy. In this case, it is likely that firms that receive loans from Almi differ from other firms because they have chosen an expensive way to finance their investments and have perhaps been (partly) rejected by a commercial bank. By combining matching and difference-in-difference regressions on the Almi firms and the control group, selection bias is reduced, and it is more likely that the estimated effects are casual. If firms that receive bank loans from Almi perform better than the matched controls, then it is reasonable to assume that these loans alleviated credit constraints and that the constraint had negative effects on firm performance. If, on the other hand, firms that receive Almi loans do not perform better than firms in the control group, it is likely that either credit rationing is not a severe

problem for these firms or that the Swedish system of public loans is inefficient.

The results indicate that Almi's loans do spur sales and labor productivity growth but only for the smallest groups of firms. The effects are significant and fairly large for sales and smaller for labor productivity. There are no statistically significant effects on employment or long-term investment. This suggests that increasing access to credit is not an efficient method of increasing firm growth.

2 Theoretical and empirical evidence of credit rationing

The body of research regarding capital market failures is both large and somewhat fragmented, with arguments in favor and against the existence of failures. There are several plausible reasons why one should expect credit markets to work less than perfectly. First, information in credit markets is asymmetric, with firms that are seeking credit having more information about the project than their financiers. This can lead to market inefficiencies due to adverse selection, where the lender cannot increase the price in accordance with the risk (Akerlof, 1970; Stiglitz and Weiss, 1981; Stiglitz and Blinder, 1983). Since creditors do not know the quality of the project that they are financing, they price according to the expected value. If entrepreneurs who have projects that are better than the average project, they will not accept a price that is based on the expected value; they would rather finance the project via other means, such as internal capital. This drives down the expected value of the projects from which the creditor can choose, leading to a death spiral in the market. In the end, creditors find no projects that are worthwhile and are not able to lend to anyone.

In the model, this means a firm that faces an upwards sloping marginal cost curve for capital. With perfect competition and symmetric information, the risk-adjusted marginal cost of capital should be constant and equal to the risk-free interest rate in the economy. However, if creditors are able to offer different types of loans to different firms, this can also mitigate the problem (Arnold and Riley, 2009). Efficient price discrimination might therefore both expand the scope and efficiency of the market. Another way to model a capital-constrained firm is as a firm that faces a wedge between the cost of internally generated capital and externally generated capital (Fazzari et al., 1988; Hubbard, 1998). If capital markets were perfect and there are no taxes, there would be no wedge between external and internal capital. With imperfect markets, asymmetric information increases the cost of, e.g., bank loans, but does not affect the opportunity cost of retaining earnings and, hence, creates a price difference between the two sources. One argument against this model is that requiring

that firms face exactly the same cost for internal as external capital is somewhat unreasonable since even a simple fee to visit a bank creates a wedge between internal and external capital costs (Kaplan and Zingales, 1997). A capital-constrained firms must therefore be one that faces a large wedge between internal and external capital relative to non-constrained firms.

When lending money to a firm, there is also a risk of moral hazard, i.e., the entrepreneur or executive might choose private benefits over the maximization of firm profit. This, in turn, might affect the probability of repaying the loan since it was used for private consumption rather than for profitable investments. This problem can be mitigated if creditors are able to screen out bad entrepreneurs ex ante and can monitor their behavior ex post (Millon and Thakor, 1985; Kaplan and Strömberg, 2001). In particular, banks might be able to monitor firms and thereby improve their behavior (Besanko and Kanatas, 1993; Cressy and Toivanen, 2001), but since screening is costly, this creates large fixed costs and makes small loans especially unprofitable.

Equity financing is one solution for financing high-risk SMEs because equity financing gives the investor larger returns if the investment is successful (Schäfer et al., 2004). A firm could raise the same amount of capital, albeit with a delay, by retaining earnings. Using retained earnings is also a safer option since a larger amount of external debt increases the risk of bankruptcy compared to internal capital, ceteris paribus.

The asymmetric information narrative assumes that the entrepreneur knows more about her project than the lender does. This might not be true since many entrepreneurs are overconfident and might have biased views of their projects (Koellinger et al., 2007). If there is also a risk of moral hazard, then the equilibrium amount of borrowing might actually be too high. This effect is increased if governments subsidize lending, leading to an increase in low-quality entrepreneurs seeking credit (De Meza and Southey, 1996; De Meza and Webb, 2000; De Meza, 2002). Indeed, when access to credit increased in Denmark following mortgage reform, entrepreneurship increased, but the new entrants were of lower quality than the incumbents (Jensen et al., 2014).

In the literature on corporate governance, different models of cash holding and demand for credit have been shown to affect firms' decisions to use bank loans, derivatives or internally generated capital from retained earnings (Tirole, 2006; Almeida et al., 2014). This is an important point since there can be several different explanations for a firm's choice of capital structure beyond gaining access to enough capital to finance a given investment. One example is a firm that wants to gain access to interest rate deductions. From an empirical point of view, this makes it even more difficult to measure credit market failures because there can be several explanations for an observed market outcome.

Starting with the work by Jaffee and Modigliani (1969), there have been many empirical

studies on the extent of credit rationing. Finding an effective, and empirically useful, measurement of credit constraints, is not simple, despite previous efforts. Following Fazzari et al. (1988), investments and cash flow are used as measures of investment, with firms that have lower cash flows also having lower investments. However, this method has been criticized by Kaplan and Zingales (1997), and the ensuing debate has not yielded conclusive results on whether this method is useful (Fazzari et al., 2000; Kaplan and Zingales, 2000). Interestingly, Farre-Mensa and Ljungqvist (2016) find that current measures of credit constraints do not predict real world behavior. They use exogenous tax increases, which increase the benefits of holding debt, to measure how firms that should be constrained based on the prevailing measures react and thereby test the predictive power of these measures. They do not find any connection between the behavior of the firm corresponding to the measures of credit constraints, and the firms that the indicators of capital constraints deem to be constrained increase their debt just as much as the non-constrained firms.

When trying to estimate market failures, it is of course necessary to take into account the quality of local institutions (Beck et al., 2004). Countries with better financial markets have more small firms entering the economy, which hopefully increases economic growth via creative destruction (Aghion et al., 2007). In a similar way, business cycles and shocks that affects banks will in turn affect firms, as in the 2008 financial crisis. In Spain, the crisis caused firms to drastically change their behavior by postponing long-term investments to survive (Garicano and Steinwender, 2016).

Based on this inconclusive literature, it should not be a surprise that different scholars reach different conclusions regarding the existence of market failures in capital markets, with some arguing in favor and some against (Parker, 2002).

2.1 Government policy as an antidote to failure

Governments in most developed nations have various policies to support SME access to capital, perhaps partly due to the results of research on capital market failure. Governments intervene in capital markets via public venture capital, direct loans to firms, credit guarantees and direct subsidies. Since these interventions are seldom allocated randomly and access to data often lacking, it is often difficult to evaluate the efficiency of these interventions.

Aggregate results using cross-country data show non-existent or negative effects of state-owned banks (Galindo and Micco, 2004). A large share of government-owned banks in 1970 is associated with less growth and less financial development in 1995 (La Porta et al., 2002). One explanation for this lack of positive results might be that state-owned banks lend money to firms with political connections or to firms located in areas where voters support a certain

political party (Sapienza, 2004). A recent study found rent-seeking in banking networks in Germany, with more rent-seeking in public banks (Haselmann et al., Forthcoming).

Local German banks with a public mandate are less cyclical than private banks and sometimes even countercyclical (Behr et al., 2017). Similar results are found by Bertay et al. (2015), who, despite this, questions the usefulness of state banks due to their inefficiency in allocating credit. It is also unclear whether procyclical lending is directed toward firms that will benefit the most from it or whether it targets firms with political connections.

Government interventions have been especially profound to increase firm R&D due to both the extra problems associated with the financing of R&D and the positive spillovers that are created by successful innovations. Therefore, a large portion of the literature focuses on credit constraints related to R&D projects. A lack of capital might effect firms' ability to invest in innovation, which in turn, reduces productivity[1]. This paper does not directly examine R&D due to data limitations. For accounting reasons, most Swedish firms do not report R&D expenses even if they spend money on R&D (small firms do not need to share as much information as large firms with the tax agency). It is therefore possible to observe whether the R&D expenditures of firms increase when they receive a loan from Almi only for a limited number of cases.

There are no other peer-reviewed studies on the effects of Almi lending using individual loan data and few others on similar banks, mainly due to a lack of good data. A noteworthy exception is Brown and Earle (2017), henceforth B&E, who study the effects of receiving loans from the Small Business Administration (SBA) in the United States. Using an impressive data set and a combination of propensity score matching and instrumental variables, they show that firms that receive SBA loans have an increase in the number of employees compared to the control group. Increasing the number of employees is the main goal of SBA loans, and B&E show that the cost of SBA loans, from default losses and administration, is low enough to make them fairly efficient.

This paper differs from B&E in several respects, the most obvious being the difference in countries and institutions studied. Moreover, SBA loans are guarantees made to commercial banks that would otherwise consider these loans to be too risky. This differs from the Swedish system wherein Almi directly negotiates the size of the loan, interest rates, etcetera, with the borrower, even in cases were a commercial bank is involved. This changes the dynamics of how loans are allocated and allows for a different analysis of the firms involved. Aside from these differences, the methods of matching and the diff-in-diff approaches in this paper and in B&E are similar.

[1]The literature regarding the public support of R&D and innovation is substantial. For recent contributions, see, e.g., Ayoub et al. (2016) and Howell (2017)

3 Government loans to firms in Sweden

The Almi group was formed in 1994 as a result of the transformation of the Swedish Regional Development Funds. The transformation of the Funds was part of a larger political agenda aimed at improving the situation for SMEs in Sweden. In particular, the ruling conservative government had identified a need to complement the market for financial services available to SMEs (Prop. 1993/94:40, 1993). Almi Företagspartner AB, the parent company, is wholly state owned. There are currently 16 regional subsidiaries responsible for loans and counseling, with a total of 40 offices spread across the country. The state holds 51 percent of the shares, and the remaining 49 percent of shares are held by local owners, such as regions (Landsting).

Almi is financed mainly through state funding and allocations from regional owners. In addition, Almi receives funding via state special funds, the Swedish regions, the EU and accumulated profits from its own operations. State-supplied equity in Almi Företagspartner consists of share equity, a reserve fund and a loan fund. The loan fund, currently valued at 5,482 million SEK, is used to finance loans distributed by regional subsidiaries. It is to be kept intact, in nominal terms, over the long run. Most years, Almi receives sufficient interest rate payments to cover its capital costs but not its wages or facilities. The state grants are therefore mainly used to pay for offices and employees. It would not be possible for Almi to run their current operations without government funding.

A similar system of state banking exists in Germany as the KfW (Kreditanstalt für Wiederaufbau). Part of it, the Mittelstandsbank, lends directly to German SMEs for both expansions and start-ups. In the U.S., the SBA lends directly to firms and provides credit guarantees to commercial banks to increase the loans to small firms.

Almi's two different businesses are lending and counseling[2]. In 2015, Almi approved loans for 4,405 companies totaling 3.2 billion SEK or roughly 700,000 SEK, on, average per firm.

Almi's role on the capital market is supplementary. Almi offers a variety of loans for different purposes, but the common goal of these loans is to promote innovation and growth in companies that are unable to obtain full financing elsewhere. Growth is defined as an increase in sales, productivity and number of employees. Since Almi has no explicit financial goal (other than maintaining the nominal value of the loan fund), they are able to lend money to projects with higher risk profiles than private lenders would be comfortable with. To compensate for this higher risk and to avoid direct competition with private agents, Almi charges interest rates that are above the market average. Almi's loans are aimed at companies

[2]Since 2013, Almi has also offered venture capital investment. Since this essay only covers loans until 2010, venture capital investments do not affect the analysis.

with up to 250 employees. Almi is allowed to administer loans without collateral. It does not follow Swedish banking legislation but is currently governed by regulation (2012:827) on state financing through regional development companies (SFS, 2012). This allows Almi to take more risks since they are not bound by, e.g., Basel III rules on banking risk.

It is common, but not necessary, for Almi to approve loans in collaboration with private actors, e.g., commercial banks. During the 2000–2010 period, the overwhelming majority of loans were given to firms in combination with commercial banks. In this respect, Almi can be regarded as a provider of 'second mortgages' for firms that have cheaper loans from commercial banks. It is this distinction between firms that receive only Almi loans and those that receive Almi loans in conjunction with commercial bank loans that makes it possible to study both the intensive and extensive margins of credit rationing. By dividing loans from Almi with loans from commercial banks, the money that the firm has committed to the project and the loans from Almi, one can calculate the share of the Almi loan of the entire project. This is equal to one if the firm has money only from Almi and is close to zero if the loan from Almi is small relative to other sources of finance. A histogram of the distribution of this variable is plotted in Figure 7 in the appendix. The most common arrangement is that the firm has 50 percent Almi funding and 50 percent internal and/or commercial bank funding. Some firms, less than 10 percent, have only Almi funding. It is, however, uncommon for firms to have a large proportion of Almi loans relative to commercial loans, with only a few firms having an Almi share above 0.8 and below 1.

In a 2002 evaluation, the authors note that Almi's operations resemble the venture capital market rather than the bank loan market. Almi's loans are often combined with counseling and strict repayment schedules – features commonly found in venture capital investments (ITPS, 2002). In a survey conducted by Almi in 2000, as many as 56 percent of all Almi clients responded that they could, in fact, have raised capital elsewhere. The most important source of financing was bank loans and second-most important source was internal funds. This suggests that Almi was not supplementing but competing with commercial banks in more than half of all cases. One should, however, bear in mind that self-perceived access to capital is often positively biased. A 2002 evaluation of Almi finds some interesting facts concerning Almi's role in the private capital market (ITPS, 2002). In a 1998 survey, companies reported that the most important capital source was retained earnings and not loans. Growth-inhibiting factors were mainly employment law and taxes coupled with business cycle factors, such as competition and interest rates. The main reason for taking on new partners was knowledge needs rather than capital needs.

Often, when a firms turns to Almi for a loan, they have been partly rejected by a commercial bank. After applying for a loan of a certain size, the commercial bank suggests that

they cannot lend that much and recommends that the firm contact Almi. The firm then negotiates with Almi and receives a loan that is partly from their bank and partly from Almi. This procedure is interesting since it might be the case that the commercial bank is offloading risk on to Almi. Since Almi has less strict requirements for collateral than commercial banks, their part of the loan is riskier. While this is intentional, Almi takes on greater risk than the commercial banks and it creates moral hazard. A commercial bank that is willing to issue a loan but would prefer to reduce their risk can tell the firm owner that they need co-financing from Almi, even though they would have been willing to lend if Almi did not exist. In this case, the commercial bank has reduced their risk, although they also reduce their profits due to less interest payments. In the end, Almi's existence reduces commercial banks' risk without increasing aggregate lending. The risk is now indirectly borne by the taxpayers who guarantee Almi's creditworthiness. This problem will be analyzed further in the conclusion since it is important for interpreting the results; however, it is difficult to address directly given the available data.

According to the pecking order theory of capital, firms should prefer debt over equity (Myers, 1984; Myers and Majluf, 1984). This is because debt, unlike external equity such as VC funding, does not reduce owner control of the firm[3]. An interesting question is where in the pecking order a loan from Almi is located. On the one hand, it is a bank loan similar to commercial bank loans. It should therefore be fairly high in the pecking order since firms prefer debt over equity. Moreover, Almi is more willing to take on risk than other banks, meaning that firms should be more willing to seek out their loans. On the other hand, according to their official statements, Almi charges higher interest rates than commercial banks do to avoid competing with them (and to cover the greater risk). The high price and purpose of the state bank means that it is possible to make two assumptions: First, firms that only receive funding from Almi represent the extensive margin of the capital market. Second, firms that receive funding from Almi along with other funding, such as commercial bank loans, represent the intensive margin of the capital market.

[3]It is unclear whether the pecking order matters as much in practice as in theory (Shyam-Sunder and Myers, 1999).

4 Data and empirical approach

Data on Almi loans is collected by Growth Analysis[4]. These data are complemented with register data on firms from Statistics Sweden (SCB). The data set on Almi loans contains information on if – and if so, how much – external funding was obtained from another bank when they obtained their Almi loan. Unfortunately there are no such data on commercial loans since banks are reluctant to release this information. Hence, it is impossible to know what types of loans, if any, the control group firms have. It is also impossible to know if firms that receive Almi loans also have older commercial bank loans. However, there is information about total debt for the control group, which is a decent proxy.

As mentioned above, since Almi both lends to firms in combination with private banks and issues loans to firms without complements, it should be possible to measure the intensive and extensive margins of the capital constraints. Loans to firms without a complementing private loan should be on the extensive margin of the credit supply curve, whereas firms with a private bank loan should be on the intensive margin. Since there are fewer firms that only receive loans from Almi, the results for these firms should be carefully interpreted.

The register data cover all Swedish firms, public and private. The large number of private firms is important since privately held firms are more likely than publicly traded firms to be credit constrained (Saunders and Steffen, 2011). Firms with fewer than 2 employees that do not receive an Almi loan are dropped to avoid noise from actors, e.g., self-employed journalists, who do not have growth ambitions and are not relevant as a control group[5]. While firms that receive Almi loans often are extremely small, they have borrowed money with the intent to grow the firm, which should ensure that these firm have growth ambitions even if they only have zero to one employees. The register data on firms cover the years 1997–2013, and the data on Almi lending cover 2000–2010. The extra register data observations are useful for estimating the effects on firms that received their loans in 2010 because this allows for three more years pre and post evaluation.

4.1 Summary statistics

Summary statistics for firms financed by Almi and all other Swedish firms are shown in Table 2. Firms that receive financing from Almi are, in general, quite small but not

[4]Growth Analysis, formally the Swedish Agency for Growth Policy Analysis, is a government agency responsible for analysis and evaluation of Swedish growth policies.

[5]A substantial number of firms do not have growth ambitions, and these entrepreneurs value non-monetary rewards, such as freedom, from running their firms (Hurst and Pugsley, 2011).

extremely small.[6]

Table 1: Summary statistics for Almis loans

	Mean	Median	Std. Dev.	Min	Max
Loan decision from Almi	596	267	1059	4.9	28404.2
Internal loan funding	463	96	1525	0	82429.4
External loan funding	1230	276	3670	0	127937.3
Interest rate on Almi loan	7.1	8	1.85	0	14.1
Share of Almi/total funding	.43	0	.247	.01	1

Notes: Summary statistics for Almi loans. All variables in 1000 kronor, inflation adjusted.

[6]A few firms had more than 250 employees in the original data set. Since Almi's policy is to not lend to firms with more than 250 employees, and this finding might be due to a merger or acquisition, these firms were dropped, eliminating 45 of more than 140 000 observations.

Table 2: Summary statistics

	Observations	Mean	Median	Std. Dev.	Min	Max
No loan from Almi						
No. employees	2178326	15	4	151	2	33644
Labor cost per emp.	2178326	227	217	146	0	69862.2813
Share high skilled	2042602	23	7	31.3	0	100
Gross investments	2178326	1480	40	30449	0	13258045
Net sales	2178326	22845	2910	389440	0	89981520
Capital stock	2177784	44203	2109	1076809	0	289741856
Labor productivity	2178326	443	371	1386	-93165.5703	965135.438
Loan from Almi						
No. employees	143293	6.4	2	14.2	0	249
Labor cost per emp.	100426	215	213	132	0	9908.14453
Share high skilled	104763	27	10	34.5	0	100
Gross investments	143293	414	19	1826	0	121438.289
Net sales	143293	7166	1529	20370	0	814599.5
Capital stock	143089	6059	1549	18567	0	1414773.25
Labor productivity	100426	366	350	571	-120621.273	27656.0645

Notes: Summary statistics for firms with and without Almi loans. All variables in 1000 kronor, inflation adjusted. Firm-year observations

4.2 Selection into Almi

Before analyzing the effects of receiving a loan from Almi on firms, we perform a selection analysis to understand which firms receive Almi loans. By running probit regressions on a dummy for being an Almi-supported firm, it is possible to study what types of firms self select into seeking and receiving an Almi loan. The results in Table 3 suggest that being a firm with a low amount of capital, a high amount of debt and low productivity increases the likelihood of becoming an Almi-financed firm the next year. These are all factors that should make a firm more credit constrained. In particular, a low amount of capital relative to debt and low productivity should be factors that make it harder for a firm to receive commercial loans and, hence, push them toward Almi.

Table 3: Who borrows from Almi

	Probit	Probit
Almi dummy		
Capital stock (log)	-0.46***	
	(0.0081)	
Total debt (log)	0.41***	0.13***
	(0.0085)	(0.0037)
No. employees	0.00066	-0.0069***
	(0.00062)	(0.00041)
No. employees squared	-0.000014***	0.00000020***
	(0.0000028)	(0.000000012)
Share high skilled	0.0045***	0.0036***
	(0.00016)	(0.00017)
Labor productivity (log)		-0.25***
		(0.0051)
Constant	-1.99***	-2.05***
	(0.16)	(0.17)
Observations	1782324	1743898

Standard errors in parentheses

Dependent variable: Dummy indicating if the firm will ever borrow from Almi. All explanatory variables values are lagged one year. Cluster-robust s.e. at the firm level. Year, regional, and industry controls. Labor productivity is defined as the value added per employee.

* p<0.1, ** p<0.05, *** p<0.01

4.3 Matching methods for causal analysis

Causal analysis without randomization is rife with problems. Since firms self select into lending from Almi, the sample is, by definition, not random. Further, there are no data on firms that apply for loans from Almi and are rejected. The control group therefore includes both firms that have access to other forms of financing and firms that were rejected from Almi. It is not ex ante obvious how firms that receive loans from Almi differ from other firms. On the one hand, these firms are seeking expensive loans that are supposed to be given to firms that the market does not support, indicating that they are worse off than other firms. On the other hand, most firms do not have any growth ambitions and prefer to rely on internal capital for any necessary (and limited) investments (Hurst and Pugsley, 2011). The simple fact that firms that borrow money from Almi have a (in their opinion) worthwhile project for which they want to borrow expensive credit might make them better than the average firm. Due to the ambiguous theoretical nature of selection bias, it is important to try and correct for this bias and not simply rely on the regression result being an upper or lower limit.

Previous research has often made use of matching to reduce selection bias. Matching techniques offer a number of benefits by reducing heterogeneity between the treated and control groups when the treatment is not randomly distributed (Ho et al., 2007; Imbens, 2015). Specifically, propensity score matching (PSM) has often been used in previous work on credit constraints (Oh et al., 2009). A more recent, and more appropriate, matching method is coarsened exact matching (CEM), which uses more moment conditions when creating the control group than other matching methods (Iacus et al., 2012). Additionally, it does not require the balancing property that must hold for PSM[7]. CEM works by coarsening each matching variable into different bins, either by manually defining the bins or by means of a pre-set algorithm. The treated group is then matched to a control in the same bin for each variable based on the moment conditions for the selected variables. This reduces observed heterogeneity in both the coefficient and the moment conditions since the treated and control cases are now more similar for each matched variable. Since CEM is matching on observable variables, there is still a risk that non-observable differences affect the results. CEM allows for both one-to-one matching and many-to-one matching. One-to-one matching means that each treated firm is given exactly one control firm. Many-to-one matching, on the other hand, assigns more than one control firm to the treated firm by assigning firms weights. In this case, it is possible to use the entire stock of firms that did not receive funding from Almi as a control group weighted on how similar they are to the Almi-financed firms.

[7]For a discussion of other drawbacks to PSM, see King and Nielsen (2016).

Firms are matched on the number of employees, debt-to-capital ratio (log debt divided by log capital), sales growth (log $sales_t$ - log $sales_{t-1}$), firm industry code (one-digit NACE code) and regional code (NUTS2)[8] the year they received their loan[9]. The coefficients are chosen to create as relevant a control group as possible. Firm size is of obvious importance, hence, the inclusion of the number of employees. Firms with collateral to pledge have a higher chance of obtaining a loan than do firms without collateral (Bester, 1985, 1987). This motivates the usage of the debt-to-capital stock as a parameter. It is also important to match on debt ratios because we cannot use debt as a control variable in the regressions. This is because a loan, by definition, will affect the total debt of a firm. To include debt would therefore create post-treatment bias that might affect the results (Iacus et al., 2012). Young firms initially tend to grow more rapidly than more mature firms (Audretsch, 1995; Coad, 2009; Coad et al., 2018). To capture this effect and ensure that growing firms are evaluated in comparison to other growing firms, growth in sales is included as a matching parameter. The industry code is important since previous research has found different effects depending on whether firms are in an industry that is more dependent on external finance (Rajan and Zingales, 1998; Hyytinen and Toivanen, 2005). Regional controls aim to capture differences among Sweden's urban areas and more sparsely populated areas.

Both one-to-one matching and many-to-one matching are performed to increase robustness and be able to use statistical methods that do not allow for weights. The difference between the treated and control groups can be measured with an imbalance score. The lower the score, the more the two groups overlap in terms of the variables that are measured. An imbalance score of 0 indicates perfect overlap, and an imbalance score of 1 indicates no overlap. The default algorithm for creating bins is used, except for the industry code, region code and employment (Blackwell et al., 2009). Because it is inappropriate to coarsen discrete variables, an exact matching method is used when matching on the industry and region code to avoid mixing continuous and discrete variables. This means that the control and treated groups must have exactly the same NACE and NUTS codes to be matched.

A problem arises from the truncation of the control group at 2 employees for the control group. To fully understand Almi's lending, firms with zero and one employees are included despite these being difficult to analyze. For example, it is impossible to use the log of employees, making the matching process more difficult. To solve this problem, we manually define the correct bin size instead of using the standard algorithm. Following the OECD's

[8]NUTS, formally Nomenclature des Unités Territoriales Statistiques, is an EU-constructed definition of different regions. The NUTS2 coding divides Sweden into eight different regions.

[9]It is standard to match before treatment. However, in this case, this results in roughly half of the treated firms being excluded since there are no observations before they receive their loans. This is most likely due to the firms being started the same year they receive their loan.

definition of firm size, the bins are 0-5, 6-10, 11-50 and >50 employees. While these are large differences in size, this is the best way to handle extremely small firms.

Matching should not be performed on an endogenous variable since this removes the variation of interest.To be able to evaluate the effects on employment later on, a separate matching that excludes the number of employees needs to be performed. For the regressions on employment, firms are matched on (log) value added and wage for labor instead of number of employees. The two variables should capture the same size effects as the number of employees, especially if there are any gains from scale. All other matching variables are identical to the matching method for the number of employees, and the default algorithm is used to create the bin sizes.

The one-to-one matching shown in Tables 9 and 10 shows a decrease in all univariate $L1$ scores except employment as well as the multivariate $L1$. The lack of an L1 decrease is due to firms with zero or one employees in the treatment group, which are absent in the control group. Despite this, the mean imbalance was much lower in the matched group. For the one-to-many matching method, the univariate $L1$ is a poor measurement by itself; it is better to look at each variable instead. In that case, the median imbalances are reduced for all variables. The matching is therefore successful in reducing observed heterogeneity. All matching results are reported in the appendix.

4.4 Empirical estimation

The literature on credit constraints is not coherent when it comes to the choice of dependent variable that should be estimated. Some papers use growth in productivity, sales, employment or productivity, whereas others use survival rates (Hyytinen and Toivanen, 2005; Kang and Heshmati, 2008). Almi is a state-owned bank intended to complement capital markets to increase firm and economic growth. Therefore, it is relevant to focus on real rather than financial variables, such as profit. Based on Almi's objective and previous research, four different outcomes that capture different aspects of firm growth are analyzed. The following difference-in-difference regression is run to estimate the effects on net sales, gross investments, labor productivity and number of employees

$$Y_{it} = \alpha_0 + \beta X'_{it} + \sum_{-5}^{8} \theta_{it} + \delta_i + \tau_t + \epsilon_{it} \tag{1}$$

where α_0 is a constant, X'_{it} is the vector of control variables described in Table 4, θ_{it} are the pre- and post-treatment dummies, δ_i are firm fixed effects, τ_t are year dummies, and ϵ_{it} is an error term. The firm fixed effects account for all systematic time-indifferent differences between the control and treatment groups.

The control variables in X'_{it} are described in Table 4. The motivation for using number of employees rather than the log of employees is the inclusion of firms with zero or one employees that receive Almi loans. The number of employees and employees squared are needed to address both gains from scale as well as any non-linear effects. The amount of capital per employee needs to be controlled for because it affects the firms' production possibilities and their ability to borrow money. More capital increases the chances of a bank loan since capital can often be used as collateral. The share of high-skilled employees should control for the type of firm, e.g., if the firm produces more complex or simpler products and address the quality of employees.

The control variables are different for different outcome variables. When estimating the effects on productivity, the amount of capital should be considered since productivity is a function of capital intensity. The number of employees and employees squared are, for obvious reasons, not included when the number of employees is estimated. Instead, value added and wage cost per employee are included. To capture any heterogeneity that was not reduced by matching, industry and regional codes are included as dummy variables. Finally, a number of variables related to the Almi loan are used to control for heterogeneity in the type of firm that receives a loan. A higher interest rate should correspond to a more risky firm and possibly worse outcomes due to higher capital costs. A lower share of Almi financing to either internal or external financing should be positive since this means that the firm was able to raise more capital without resorting to Almi. The yearly dummies should eliminate any business cycle effects.

Table 4: Control variables

Variable	Description
Capital Stock per employee	Total capital / employees
Number of employees	
Number of employees squared	
Value added per labor	Total value added / number of employees
Wage cost per employee	Total wage cost / number of employees
Share of employees with tertiary education	Tertiary/ primary+secondary+tertiary
Size Almi loan	In real SEK
Size of external finance	In real SEK
Size of own finance	In real SEK
Ratio of Almi loan to other finance	Almi loan / Almi+external+own
Industry codes	One-digit NACE code
Regional codes	NUTS2 regions

The most interesting variables in θ_{it}, measuring the treatment effect on the treated firms on a year-to-year basis. Since the effect might be increasing or diminishing, it is safer to use one dummy for each post-treatment year than only one dummy that measures the average treatment effect. If the treatment effect is constant over time, using a single dummy is more efficient than using one per year. However, since it is difficult to predict the time-varying effects of a loan, it is more prudent to use several dummies. It is interesting to see how firms behaved before they received a loan, so dummies for the five years before they received their first payment are included. In Figure 4-2 below, the firms receive their loan on the sixth dummy, and the following eight dummies show the post-treatment effect. The choice of eight years for the post-treatment and five for the pre-treatment periods is slightly ad hoc. Since the panel for Almi loans ends in 2010 and that for the register data ends in 2013, firms that received their loans in 2010 only have three years of post-treatment observation. A longer post-treatment analysis leaves fewer observations and thus leads to larger standard errors. Similarly, a firm started in 2005 and granted their loan in 2006 will only have one pre-treatment observation. Still, eight years should be more than enough given the average product development life cycle(Kamran, 2014; Griffin, 2002). Indeed, eight years might be too long a time frame since there are so many factors that can affect firms over such a long time (Mian and Sufi, 2012). The results for the later treatment years should therefore be carefully considered.

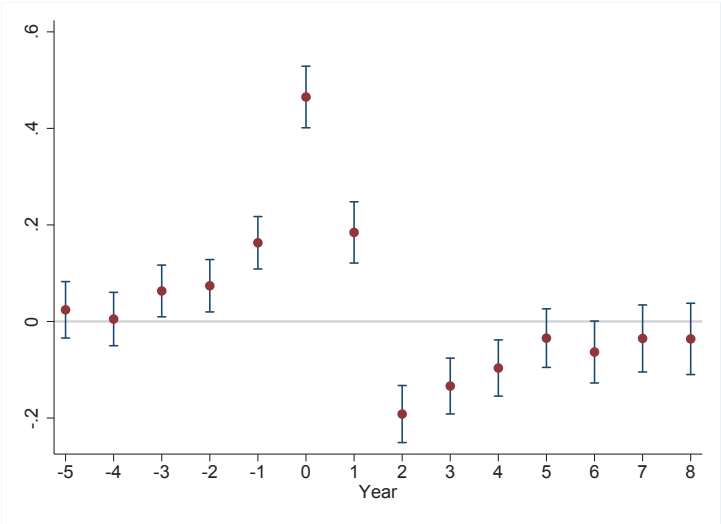
It is quite common that firms that are granted a loan receive it in several payouts, creating difficulties for the post-treatment analysis. The treatment dummy is coded for the first payout for two reasons. Since the data set is based on yearly observations, is it possible that the payouts are close, i.e., one in December and one in January, in which case they will

appear to be one year apart without any practical difference. Second, when a firm has been granted a loan and know when the money will be disbursed, is seems reasonable to assume that the firm is able to adjust its behavior.

4.5 Regression results

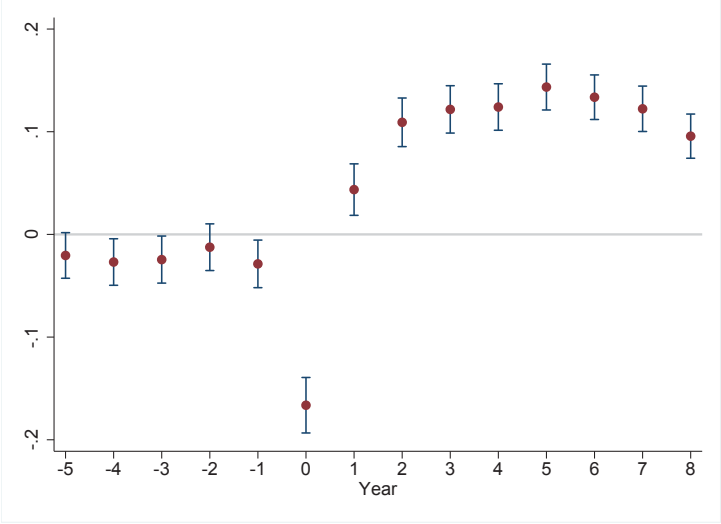
To illustrate how the treatment effect evolves over time, the treatment dummies from the matched regressions are plotted in figures 1–4. The timing is normalized so that the loan is received by the firm in year 0, and the pre-treatment years are coded as -1, -2, and so on. Post-treatment years are similarly coded as 1, 2, and so on. The previous observations show whether there is any effect on the firms before they receive their loan to ensure that there is a common trend before treatment. A different trend might exist if firms have rational expectations regarding their future need for finance and are able to change their behavior beforehand. In all regressions, standard errors are clustered at the firm level to ensure that the results are not biased by firm-level correlations in the standard errors. The results do not change if one uses heteroskedasticity-robust standard errors instead.

Figure 1: Effects on investment of an Almi loan.



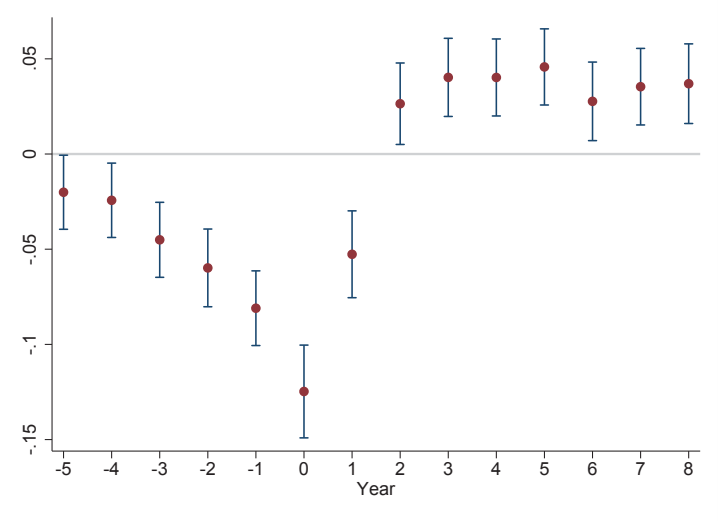
Regressions results based on many-to-one matching fixed effects regressions. The firms receive their loans in year 0. Points show regression results with 95% confidence intervals.

Figure 2: Effects on net sales of an Almi loan.



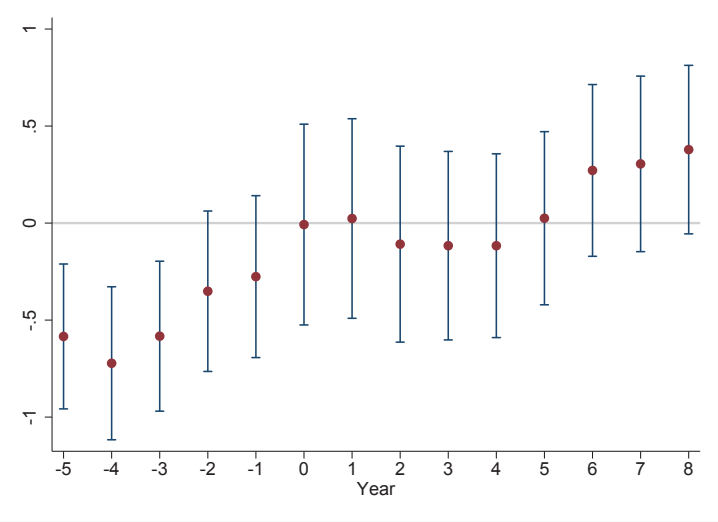
Regressions results based on many-to-one matching fixed effects regressions. The firms receive their loans in year 0. Points show regression results with 95% confidence intervals.

Figure 3: Effects on labor productivity of an Almi loan.



Regressions results based on many-to-one matching fixed effects regressions. The firms receive their loans in year 0. Points show regression results with 95% confidence intervals.

Figure 4: Effects on no. of employees of an Almi loan.



Regressions results based on many-to-one matching fixed effects regressions. The firms receive their loans in year 0. Points show regression results with 95% confidence intervals.

The effect on investment is shown in Figure 1, which shows a drastic increase in investment when firms receive their loans followed by a subsequent decrease. The increase is consistent with the aim of the loan to finance the purchase of machinery or similar investments. Once the firm has invested, they need to pay off their loan, use their new investments, and so on, which could explain the rapid decrease in investment in the following years. This post-treatment decay in investment suggests that the loan did not trigger any long-run increase in investment since no observation is significant in years 5–8.

The results in Figure 2 show a small but lasting effect on sales. The sharp drop in the year that the firms receive their loan is most likely caused by new firms that received their loans the same year they were established. Brand new firms are unlikely to have a large number of sales. After the firms receive their loans, there is a significant increase in sales compared to the control group, although the results seems to diminish over time. The results are both statistically and economically significant, increasing by more than 10 percent.

Labor productivity also increases after firms receive their loan, as shown in Figure 3. The large decrease the year before firms receive their loans is most likely caused by entry into the market. Entrants have fewer sales and, hence, less valued added per worker. The decrease is the largest in the year the firm receives their loan, consistent with the fact that Almi lends to brand new firms. The post-treatment increase is statistically significant, with a point estimate 5 percent higher.

The effects on the number of employees, shown in Figure 4, goes from significantly negative to weakly positive after six to eight years. While a slight upwards trend can be noted, it is not significant at the 5 percent level, indicating that the loan did not increase the number of employees among these firms. This differs from the results of B&E, who found significant increases in the number of employees among firms that received SBA loans, and indicates that these loans are not successful in increasing the number of employees among the targeted firms.

Looking at the control variables in Tables 11–12, capital is positive for both outcomes. Since a larger capital stock increases the possibility of gaining access to finance and can be correlated with productivity, this result seems in line with theory. The share of high-skilled labor is positive for the regressions on productivity in Table 13, which is in line with human capital theory. However, the coefficients are significantly negative for all other regressions. This might suggest that high-skilled firms have a harder time grow than non-high-skilled firms. The interest rate on Almi loans is negative for all regressions except sales. It is interesting that the interest rate is negative for the regressions on employment in Table 14. A high cost of capital should, ceteris paribus, increase investment in labor to substitute away from (expensive) capital. Firms that obtain loans with high interest rates from Almi may be

so risky and credit constrained that they cannot afford to increase labor despite high capital costs. This high riskiness might explain the positive effects on sales.

4.6 Robustness checks

To ensure that the results do not depend on the current choice of variables or sample size, a number of robustness tests are carried out[10]. Value added per employee is an estimate of labor productivity. If one instead wants to measure total factor productivity, methods such as those suggested by Levinsohn and Petrin (2003); Petrin et al. (2004) and Wooldridge (2009) can be used. The productivity regressions are therefore re-estimated after switching the dependent variable from labor productivity to total factor productivity. The results are no longer positive for all post-treatment years, only for some. This suggests that Almi loans increase labor productivity (most likely due to increased net sales) but do not have a large effect on total factor productivity.

Given the existence of adjustment costs of employment in the form of hiring and firing costs, a static OLS specification might not be a suitable in the Swedish context since the labor protection laws are relatively strict[11]. Instead, a lagged dependent variable or GMM-based approach is necessary to address strong autocorrelation over time. Since the panel has a fairly short time dimension and a large N, a systems or difference GMM is appropriate (Blundell and Bond, 1998; Roodman, 2009). The regressions on the employment effects are therefore re-run using lagged employment as an explanatory variable. The results from the three different dynamic labor specification models show weakly significant negative effects on employment, even over the long run[12]. These differ from the results shown in Figure 4, which showed a small upwards trend. Taking these results together, it seems prudent to suggest that there is no positive result on employment from Almi loans, and the results might even be negative.

Different sized firms might effect the results as well since smaller firms might have less access to credit than larger firms. Larger firms may have longer credit histories, better collateral and stronger administrative capabilities than smaller firms. To investigate whether the effects are different for slightly larger firms, the regressions are re-run for firms with 10 or more employees and for firms with 10 or fewer employees. For larger firms, the investment pattern remains the same as the main result, but the positive results on productivity and

[10] All regression tables are available on request, and the tables for the main regressions are included in the appendix.

[11] For a detailed analysis of Swedish employment protections and their effects, see, e.g., Bjuggren (2018) and Bornhäll et al. (2017)

[12] The GMM regression uses principal component analysis to select the number of instruments. All regressions pass AR1, AR2 and Hansen tests.

sales disappear. Among firms with 10 or fewer employees, the long-run results are positive for sales, productivity and employment. This suggests that the positive results found in the main regressions above were driven by the smallest firms in the sample. These firms should also be the most affected by credit market failures and should therefore benefit the most from Almi loans.

Most firms that borrow from Almi also borrow from commercial banks, as previously described. To try and separate the extensive margin from the intensive margin, regressions are run using firms that borrow exclusively from Almi. This is an imperfect measure since these firms are different from the average Almi borrower and are a fairly small sub-group. Still, it is an interesting sample, especially since these firms might be more credit constrained than other firms. Only sales remains positive, with productivity now becoming non-significant. This suggests that firms are mainly credit rationed on the intensive rather than on the extensive margin.

One argument against the empirical strategy followed in this paper is that it compares new firms with older firms. Firms that borrow from Almi are often brand new firms, and the matched control group includes firms that can be both young and old. To address this and create a control group of younger firms, we run a separate matching. This one excludes all observations on firms that existed in 1997 when the panel starts. The control groups is then reduced by approximately 50 percent, dropping firms that received loans from Almi as well as firms that did not. This ensures that both the control group and the treated group consist of fairly young firms, i.e., at the earliest, they were started in 1998. The aim is to reduce any bias from comparing new firms to old firms. After this new matching procedure, all regressions are re-run with the new control and treatment groups, including all the robustness checks. The main results remain strikingly similar, strengthening the validity of the results. All results are available on request.

One problem that cannot be addressed is that firms drop out of the panel. Firms might exit for either positive reasons, such being bought by another firm, or negative reasons, such as going bankrupt. Unfortunately, due to data limitations, it is impossible to observe why firms exit the panel. An avenue for future research might be to explore whether firms that borrow from Almi are more likely to go bankrupt or exit for other reasons.

This paper controls for regional and industry effects. An avenue for future research could be to explore how the results vary with, for example, population density to see if there are regional variations. In theory, more sparsely populated areas could be more credit constrained since banks do not find it worthwhile to invest in these areas. However, this paper only studies the direct effects of government loans and does not look at spillovers at the regional level or at R&D output. While these effects might be important, it is also

unlikely that there will be large spillovers if there are small directs effects. Recent research has found no regional spillovers from SBA lending in the U.S. (Lee, 2018). In addition, this paper does not estimate the level of crowding-out of private credit from Almi loans. Since previous research has found large crowding-out effects, this might further reduce the efficiency of public loans (Li, 2002; Cumming and MacIntosh, 2006). The gains in sales and labor productivity must also be weighed against the costs of collecting taxes to fund Almi, which could be high in Sweden (Lundberg, 2017).

5 Discussion

This paper aimed to study the effects of public loans on SMEs, both when they only have public loans and when they public loans in conjunction with commercial loans. The results indicate that firms with low productivity and large amounts of debt choose expensive Almi loans along with commercial loans. To control for selection bias when estimating the treatment effect, matching and difference-in-difference regressions have been used. While this does not entirely eliminate the bias, the matching results show that is has been reduced. The results are also robust to several different parameters and estimation methods.

While this paper tries to control for selection bias, it is possible that firms without Almi loans would still have been able to raise sufficient amounts of credit. Commercial banks are able to reduce their risk by demanding that firms that they otherwise would lend to also seek out Almi loans. In those cases, Almi increases the profits of commercial banks by reducing their credit losses in cases of default and does not increase overall access to credit. If so, then the main beneficiary of Almi's loans might be the shareholders of commercial banks that are able to reduce their risk. Unfortunately, since there is so little randomization in Almi's distribution of lending, and since there is no access to commercial bank loans interest rates and terms, it is difficult to answer this question.

The effects of the loans are modest, increasing sales and productivity for firms with 10 or fewer employees. This seems reasonable given the theoretical view that SMEs are more credit rationed than other firms. It could however also be caused by the fact that small firms grow, in percentage terms, faster than larger firms. New firms can increase their sales by several hundred percent per year, a feat that is not possible for more mature firms. It is possible that this effect is so profound that it biases the results despite all the control variables included.

There are several possible explanations for the observed lack of growth in employees. Firms might lack a desire to grow, which requires the firm owner to become a manager. There might be a lack of individuals with the correct skills to hire, making it difficult to find

a good match. Finally, Sweden's strict labor protection laws might make firms reluctant to hire.

The lack of strong results might be due to inefficient targeting of Almi funds to credit constrained firms with good projects, either due to self selection or for some other reason. Finding firms with valuable ideas is difficult because projects are, by their very nature, difficult to evaluate. On the other hand, the null result might indicate that Almi is able to "push" firms to become as productive as ordinary firms, which could be considered a success if this increase is stable over time. A third possibility is that the assumption of asymmetric information is incorrect. It might be the case that entrepreneurs do not in fact have better information about the expected value of their project than the banks since the entrepreneurs might be overconfident. If this is the case, then encouraging more people to become entrepreneurs by increasing access to credit might be a problematic policy (Shane, 2009). The lack of an increase in the number of employed is problematic, since increasing the number of employed in the targeted firms is one of Almi's explicit goals.

A final explanation might be that credit markets are somewhat efficient and that Almi is successful in financing firms on the intensive or extensive margin. While this paper does not conclude that this is the case, a couple of points can be made in favor of this idea. First, as mentioned in the introduction, there is a lack of efficiency with direct subsidies as well. Second, Sweden has an efficient public sector according to most measurements, and there is no indication of corruption or similar problems with Almi's loan decisions. Third, in surveys of firms, access to credit is seldom considered to be the main obstacle to firm growth. Fourth, Sweden has an efficient market economy according to various measure, e.g., the World Bank's Ease of Doing Business Index, and should therefore have fewer problems with credit rationing than developing countries. Studies that have found financial frictions to be important barriers to firm growth have found larger effects in developing countries and smaller effects in developed countries (Aghion et al., 2007). Fifth, many entrepreneurs want to preserve their independence, and they are not willing to use external capital even if they are paid more than the market value (Bornhäll et al., 2016). This means that even if the market for external capital were perfect, some firms would still not utilize it because they value control and independence over profit maximization. Finally, Sweden has markedly stricter personal bankruptcy laws than does the U.S. This in turn reduces the risk for creditors, especially when entrepreneurs use their homes or similar possessions as collateral, possibly reducing credit constraints.

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A Appendix

A.1 Matching statistics

Table 5: Matching summary one-to-many for sales, investment and productivity

Number of strata	11511	
Number of matched strata	1822	
	Control Group	Treated
All	2178326	17269
Matched	1946258	17212
Unmatched	232068	57

Table 6: Matching summary one-to-one for sales, investment and productivity

Number of strata	11511	
Number of matched strata	1822	
	Control Group	Treated
All	2178326	17269
Matched	13673	13673
Unmatched	2164653	3596

Table 7: Matching summary one-to-many for labor

Number of strata	72164	
Number of matched strata	4764	
	Control Group	Treated
All	2178326	17269
Matched	1448931	15605
Unmatched	729395	1664

Table 8: Matching summary one-to-one for labor

Number of strata	72164	
Number of matched strata	2444	
	Control Group	Treated
All	2178326	17269
Matched	13673	13673
Unmatched	2164653	3596

Table 9: Matching results for sales, investment and productivity

Unmatched							
Variable	L1	Mean	Min	25%	50%	75%	Max
No. employees	.18947	-10.45	-2	-2	-2	-4	-33439
Log of debt to capital	.23962	.34335	5.6466	.33256	.23051	.15012	-3.5421
Sales growth	.44066	.02796	4.2167	.07695	-.00067	-.09882	-4.4766
Multivariate L1	.736382						
Matched one-to-many							
Variable	L1	Mean	Min	25%	50%	75%	Max
No. employees	.51451	-1.6267	-2	-2	-1	-1	-6714
Log of debt to capital	.15424	.06213	.05215	.0412	.04153	.05057	.
Sales growth	.38088	-.06752	.47842	0	-.05489	-.18798	.62819
Industry code	2.0e-12	-7.6e-12	0	0	0	0	0
Region code	1.8e-12	-1.6e-11	0	0	0	0	0
Multivariate L1	.94306009						
Matched one-to-one							
Variable	L1	Mean	Min	25%	50%	75%	Max
No. employees	.51613	-1.5519	-2	-2	-1	-1	-68
Log of debt to capital	.14291	.06271	.05215	.04254	.04406	.05029	.
Sales growth	.30947	-.07062	.47842	0	-.05762	-.19168	.62819
Industry code	0	0	0	0	0	0	0
Region code	0	0	0	0	0	0	0
Multivariate L1	.87609694						

Table 10: Matching results for labor

Unmatched							
Variable	L1	Mean	Min	25%	50%	75%	Max
Log of wage per employee	.12099	-.16101	2.4278	-.16603	-.07509	-.08712	-1.9973
Log of value added	.18474	-.545	.04738	-.46247	-.47678	-.30361	-5.6033
Log of debt to capital	.25534	.30011	7.4962	.33712	.21789	.11941	-5.7477
Sales growth	.36045	.07242	6.1557	.07333	-.00387	-.00288	-4.4766
Multivariate L1	.98639507						
Matched one-to-many							
Variable	L1	Mean	Min	25%	50%	75%	Max
Log of wage per employee	.05836	.00225	0	.01245	.00048	.	.
Log of value added	.08577	-.01935	0	-.09502	-.05151	-.00171	.
Log of debt to capital	.14398	.05114	.16942	.0499	.01698	.02183	.
Sales growth	.25577	-.03889	-.27701	0	0	-.14404	.14248
Industry code	1.0e-12	3.9e-12	0	0	0	0	0
Region code	1.0e-12	3.5e-12	0	0	0	0	0
Multivariate L1	.97226486						
Matched one-to-one							
Variable	L1	Mean	Min	25%	50%	75%	Max
Log of wage per employee	.07259	.22014	-2.1251	.04118	-.01507	.	.
Log of value added	.0787	.01852	.05607	.00227	-.09917	.18124	.
Log of debt to capital	.12671	.09881	.16942	.12496	.0656	.04369	.
Sales growth	.21932	.01573	-.27701	0	0	-.07913	.51885
Industry code	.08886	-.20323	0	0	0	-1	0
Region code	.0839	.22103	0	1	1	0	0
Multivariate L1							

A.2 Various statistics

Almi grants different loans for different purposes. The main loan is Tillväxtlån, i.e., a growth Loan, coded "TL" below.

Figure 5: Distribution of Almi's different loans

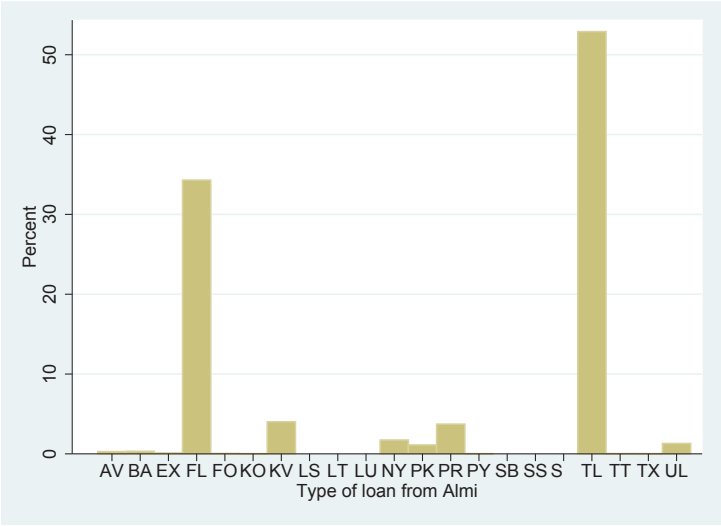


Figure 6: Distribution of Almi's financed industries

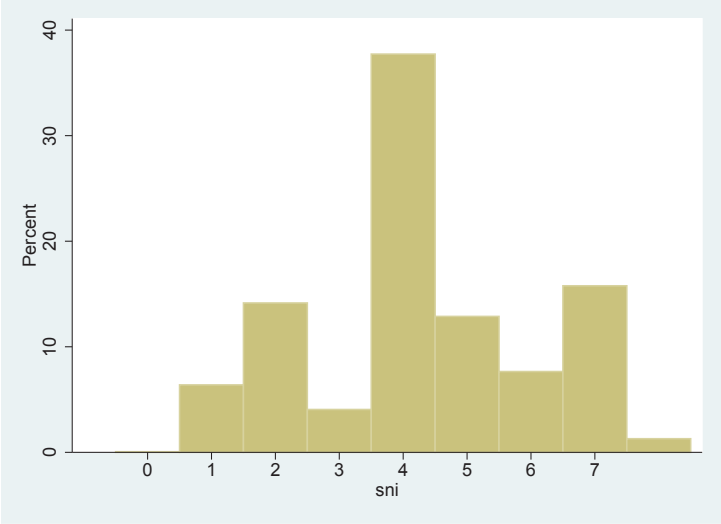


Figure 7: Almi's share of total project loans

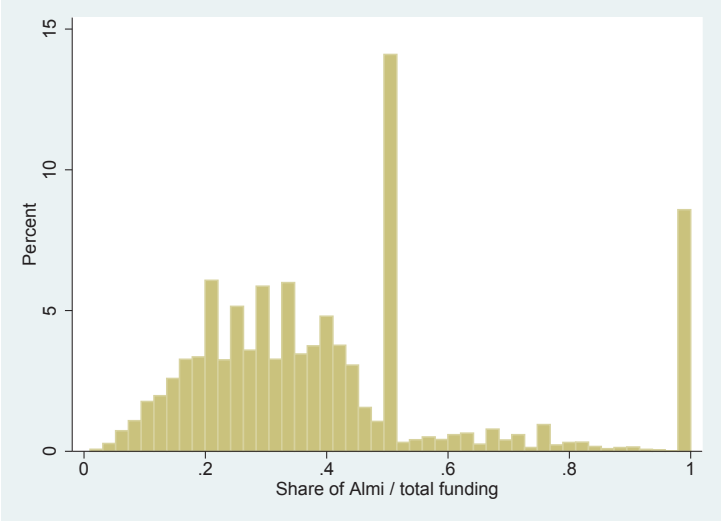


Figure 8: Distribution of Almi's regional lending

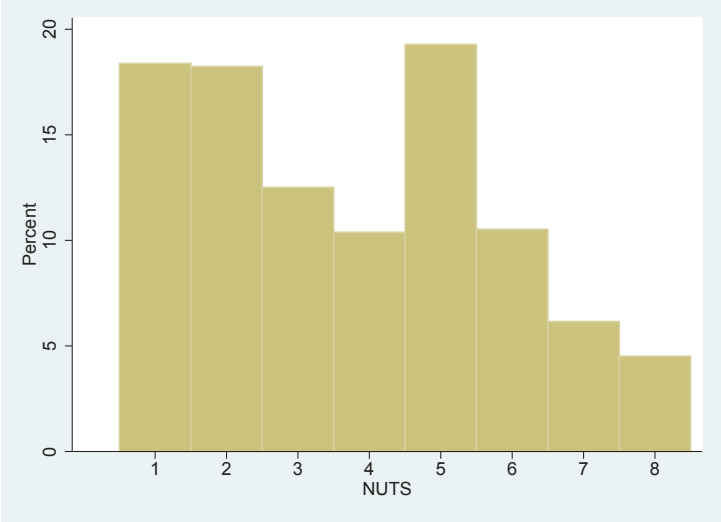
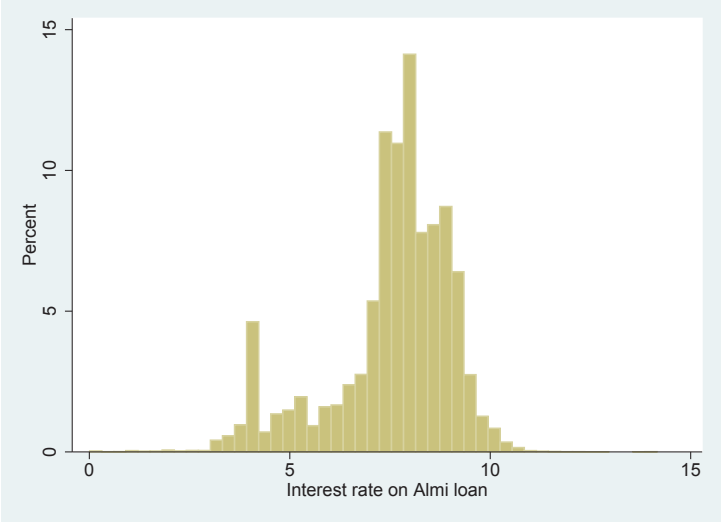


Figure 9: Distribution of Almi's interest rates



A.3 Regression results

Complete regression results for the main regressions. The output for the treatment variables from the CEM matching was plotted in Figure 4–2. K2K match means that the treated firm was matched one to one, which explains the drastically lower number of observations.

Table 11: Investment

	Full Sample	Matched	K2K Matched
Pre-treatment year 2	0.056**	0.057**	0.051**
	(0.024)	(0.024)	(0.024)
Pre-treatment year 1	0.14***	0.15***	0.14***
	(0.024)	(0.025)	(0.025)
First loan injection	0.46***	0.45***	0.45***
	(0.030)	(0.030)	(0.031)
Post-treatment year 1	0.17***	0.17***	0.17***
	(0.030)	(0.030)	(0.031)
Post-treatment year 2	-0.19***	-0.21***	-0.20***
	(0.028)	(0.028)	(0.029)
Post-treatment year 3	-0.13***	-0.15***	-0.15***
	(0.027)	(0.028)	(0.028)
Post-treatment year 4	-0.095***	-0.11***	-0.12***
	(0.027)	(0.028)	(0.029)
Post-treatment year 5	-0.024	-0.049*	-0.066**
	(0.029)	(0.029)	(0.030)
Post-treatment year 6	-0.044	-0.078**	-0.099***
	(0.030)	(0.031)	(0.032)
Post-treatment year 7	-0.023	-0.050	-0.078**
	(0.033)	(0.034)	(0.035)
Post-treatment year 8	-0.019	-0.050	-0.077**
	(0.036)	(0.037)	(0.038)
Capital stock (log)	0.85***	0.88***	0.88***
	(0.0033)	(0.0044)	(0.0093)
No. employees	0.00071***	0.0019***	0.0046***
	(0.000080)	(0.00027)	(0.00087)
No. employees squared	-0.000000032***	-0.00000014***	-0.0000049**
	(4.7e-09)	(0.000000036)	(0.0000022)
Share high skilled	-0.00059***	-0.00044***	-0.00030
	(0.00012)	(0.00015)	(0.00032)
Internal loan funding (log)	0.017***	0.016***	0.017***
	(0.0045)	(0.0045)	(0.0045)
External loan funding (log)	0.016***	0.014***	0.014***
	(0.0052)	(0.0052)	(0.0052)
Interest rate on Almi loan	-0.011*	-0.0095	-0.012**
	(0.0062)	(0.0062)	(0.0063)
Share of Almi / total funding	-0.27***	-0.28***	-0.27***
	(0.063)	(0.063)	(0.064)
Dummy for no. years in the panel	-0.11***	-0.15***	-0.13***
	(0.0081)	(0.012)	(0.020)
Constant	-1.33***	-1.53***	-1.56***
	(0.21)	(0.27)	(0.26)
Observations	1466950	1439367	168323

Standard errors in parentheses
Dependent variable: Log investment. Cluster robust s.e. at the firm level. Firm fixed effects.
* p<0.1, ** p<0.05, *** p<0.01

Table 12: Sales

	Full Sample	Matched	K2K Matched
Pre-treatment year 2	-0.0016	-0.0013	-0.010
	(0.0094)	(0.0093)	(0.0090)
Pre-treatment year 1	-0.024**	-0.018*	-0.032***
	(0.010)	(0.010)	(0.0099)
First loan injection	-0.16***	-0.16***	-0.17***
	(0.013)	(0.013)	(0.012)
Post-treatment year 1	0.057***	0.054***	0.031***
	(0.012)	(0.012)	(0.012)
Post-treatment year 2	0.13***	0.12***	0.090***
	(0.011)	(0.011)	(0.011)
Post-treatment year 3	0.14***	0.13***	0.11***
	(0.011)	(0.011)	(0.011)
Post-treatment year 4	0.15***	0.13***	0.11***
	(0.011)	(0.011)	(0.010)
Post-treatment year 5	0.17***	0.15***	0.12***
	(0.011)	(0.011)	(0.010)
Post-treatment year 6	0.16***	0.14***	0.11***
	(0.011)	(0.011)	(0.010)
Post-treatment year 7	0.16***	0.13***	0.10***
	(0.011)	(0.011)	(0.011)
Post treatment year 8	0.13***	0.10***	0.076***
	(0.011)	(0.011)	(0.010)
Capital stock (log)	0.53***	0.48***	0.48***
	(0.0018)	(0.0039)	(0.0056)
No. employees	0.0017***	0.0081***	0.028***
	(0.00014)	(0.0010)	(0.0018)
No. employees squared	-0.000000079***	-0.00000062***	-0.000044***
	(0.000000010)	(0.00000015)	(0.000010)
Share high skilled	-0.00064***	-0.00053***	-0.00093***
	(0.000053)	(0.000069)	(0.00014)
Internal loan funding (log)	-0.010***	-0.0087***	-0.0090***
	(0.0019)	(0.0019)	(0.0018)
External loan funding (log)	0.0011	0.0016	-0.0031
	(0.0022)	(0.0022)	(0.0021)
Interest rate on Almi loan	0.0074***	0.0069***	0.0100***
	(0.0026)	(0.0025)	(0.0025)
Share of Almi / total funding	-0.022	-0.015	-0.037
	(0.025)	(0.024)	(0.024)
Dummy for no. years in the panel	0.041***	0.041***	0.046***
	(0.0045)	(0.0059)	(0.010)
Constant	3.90***	4.18***	3.78***
	(0.10)	(0.14)	(0.39)
Observations	2140026	2105988	246418

Standard errors in parentheses
Dependent variable: Log sales. Cluster robust s.e. at the firm level. Firm fixed effects.
* p<0.1, ** p<0.05, *** p<0.01

Table 13: Productivity

	Full Sample	Matched	K2K Matched
Pre-treatment year 2	-0.046***	-0.045***	-0.052***
	(0.0090)	(0.0091)	(0.0091)
Pre-treatment year 1	-0.069***	-0.067***	-0.074***
	(0.0088)	(0.0089)	(0.0090)
First loan injection	-0.11***	-0.11***	-0.11***
	(0.012)	(0.012)	(0.012)
Post-treatment year 1	-0.037***	-0.039***	-0.040***
	(0.011)	(0.011)	(0.011)
Post-treatment year 2	0.041***	0.040***	0.038***
	(0.010)	(0.010)	(0.010)
Post-treatment year 3	0.057***	0.053***	0.053***
	(0.0096)	(0.0098)	(0.0099)
Post-treatment year 4	0.059***	0.053***	0.054***
	(0.0096)	(0.0097)	(0.0098)
Post-treatment year 5	0.059***	0.058***	0.057***
	(0.0096)	(0.0097)	(0.0098)
Post-treatment year 6	0.043***	0.040***	0.039***
	(0.010)	(0.010)	(0.010)
Post-treatment year 7	0.057***	0.047***	0.046***
	(0.0098)	(0.0099)	(0.010)
Post-treatment year 8	0.052***	0.049***	0.048***
	(0.011)	(0.010)	(0.011)
No. employees	-0.00037***	-0.0016***	-0.0038***
	(0.000045)	(0.00018)	(0.00045)
No. employees squared	0.000000015***	0.00000012***	0.0000046***
	(2.5e-09)	(0.000000024)	(0.0000017)
Share high skilled	0.00039***	0.00025***	0.000041
	(0.000044)	(0.000062)	(0.00013)
Internal loan funding (log)	-0.0060***	-0.0054***	-0.0055***
	(0.0017)	(0.0017)	(0.0017)
External loan funding (log)	0.0070***	0.0078***	0.0081***
	(0.0020)	(0.0020)	(0.0020)
Interest rate on Almi loan	-0.00073	-0.0013	-0.0026
	(0.0025)	(0.0025)	(0.0025)
Share of Almi / total funding	-0.033	-0.022	-0.022
	(0.024)	(0.024)	(0.025)
Dummy for no. years in the panel	-0.0035	0.0040	0.021*
	(0.0033)	(0.0043)	(0.011)
Constant	5.60***	5.60***	5.84***
	(0.080)	(0.11)	(0.26)
Observations	2093911	2061477	229386

Standard errors in parentheses
Dependent variable: Labor productivity. Cluster robust s.e. at the firm level. Firm fixed effects.
* p<0.1, ** p<0.05, *** p<0.01

Table 14: Employment

	Full Sample	Matched	K2K Matched
Pre-treatment year 2	-0.28	-0.064	-0.044
	(0.18)	(0.14)	(0.14)
Pre-treatment year 1	-0.41**	0.0061	0.0064
	(0.19)	(0.16)	(0.16)
First loan injection	-0.080	0.26	0.39*
	(0.25)	(0.22)	(0.22)
Post-treatment year 1	-1.04***	0.29	0.34
	(0.27)	(0.23)	(0.22)
Post-treatment year 2	-1.79***	0.15	0.18
	(0.29)	(0.23)	(0.22)
Post-treatment year 3	-2.02***	0.14	0.13
	(0.30)	(0.22)	(0.21)
Post-treatment year 4	-2.00***	0.14	0.15
	(0.30)	(0.22)	(0.21)
Post-treatment year 5	-2.12***	0.27	0.25
	(0.31)	(0.21)	(0.20)
Post-treatment year 6	-1.75***	0.51**	0.47**
	(0.31)	(0.22)	(0.20)
Post-treatment year 7	-1.80***	0.54**	0.49**
	(0.33)	(0.22)	(0.21)
Post-treatment year 8	-1.49***	0.60***	0.56***
	(0.32)	(0.22)	(0.20)
Labor cost per emp. (log)	-12.9***	-5.01***	-5.06***
	(0.89)	(0.19)	(0.18)
Value added (log)	13.0***	5.49***	5.63***
	(0.74)	(0.14)	(0.14)
Share high skilled	-0.044***	-0.011***	-0.0018
	(0.012)	(0.0026)	(0.0019)
Internal loan funding (log)	0.053	0.0063	0.014
	(0.034)	(0.033)	(0.033)
External loan funding (log)	-0.017	0.14***	0.13***
	(0.042)	(0.038)	(0.037)
Interest rate on Almi loan	-0.043	-0.13***	-0.13***
	(0.046)	(0.041)	(0.041)
Share of Almi / total funding	0.54	0.46	0.41
	(0.43)	(0.37)	(0.38)
Dummy for no. years in the panel	-1.60**	-0.19	0.14
	(0.74)	(0.28)	(0.18)
Constant	-5.29	-11.7**	-3.03
	(3.74)	(4.90)	(2.00)
Observations	2091279	1971053	229051

Standard errors in parentheses
Dependent variable: Number of employees. Cluster robust s.e. at the firm level. Firm fixed effects.
* p<0.1, ** p<0.05, *** p<0.01

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Sakkunniga medarbetare, unika databaser och utvecklade samarbeten på nationell och internationell nivå är viktiga tillgångar i vårt arbete. Genom en bred dialog blir vårt arbete relevant och förankras hos de som berörs.

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