Asset purchase programs, leveraged firms and spillovers to competitors*

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Abstract

Large scale asset purchase programs might have unintended side-effects on small and medium enterprises (SMEs). By exploiting the first large scale asset purchase program of the ECB, this paper links asset purchases and bank lending as well as spill-over effects on German firms. Estimations show that medium and highly leveraged firms connected to weak banks show larger borrowings. I find spill-over effects to competitors: Highly leveraged firms which do not benefit from the program and operate in the same region show lower investment activities. The asset purchases seem to contribute to a cleansing effect. However, these results do not hold for regions with low unemployment rate, where competition for resources is high between firms. Here, the lowly leveraged firms show lower investment activities as a response.

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1 Motivation

The degree of indebtedness of market participants plays an important role for financial and economic stability and economic development. Highly leveraged firms react more sensitive to decreased demand by reducing their labour force more quickly and thereby contributing to a propagation of adverse shocks (Sharpe, 1994). They performed worse in and after the great recession in terms of poorer sales growth, investment behavior and employment (Altunok and Oduncu, 2013; Kuchler, 2015; Giroud and Mueller, 2015). According to Traczynski (2017), firm leverage is one of the main explanatory variable for default risk. Cathcart et al. (2018) even claim it is the most important explanatory variable for default risk of small and medium enterprises (SMEs).

Large scale asset purchase programs (LSAP), which are part of unconventional monetary policy measures might induce a change in lending behavior of banks as unintended side-effects. The zombie lending literature argues that weak banks might make use of small windfall gains due to asset purchases by evergreening loans to borrowers close to default, to avoid a loss to their own balance sheet (Giannetti and Simonov, 2013). Highly leveraged firms might be the beneficiaries. These unintended side-effects are not problematic as long as competitors do not face draw-backs. This paper first aims at corroborating previous results that LSAPs induce a change in lending behavior as an unintended side-effect by exploiting the first LSAP of the ECB, the Securities Market Program (SMP). The focus of the paper lies on the assessment of spill-over effects to firms operating in the same region of beneficiaries and investigates whether there are adverse effects on competitors.

Adverse effects of lending to firms which are close to default has been studied especially in Japan. The so called zombie ending behavior has impaired the Japanese economy from growing (Peek and Rosengren, 2005; Caballero et al., 2008). Firms which should actually default but continue existing can hinder productivity growth and might prevent further lending to more productive firms (Andrews and Petroulakis, 2017). McGowan et al. (2017) claim that unconventional monetary policy could be responsible for encouraging zombie lending behavior. However, even for the Japanese case, this claim has not been extensively tested yet.

The main contribution of my paper is to conduct the first granular study to assess the spill-over effects of increased lending activities from weak banks to highly leveraged firms on competitors operating in the same region or industry. In particular, this paper provides evidence on the conditionality on the current economic state of the unit of observation. Previous studies on zombie-lending are inconclusive on effect on surrounding firms within same region or within same industry. Caballero et al. (2008) find adverse effects on profits of healthy firms, whereas Schivardi et al. (2017) do not find negative effects on competitors. The latter argue that competitors benefit from zombie lending due to stabilization of aggregate demand in their region, however, they cannot provide evidence for the contention. My paper can add to this by showing adverse effects which depend on labor market tightness of the region.

Exposure to SMP eligible assets which were purchased is low among German savings and cooperative banks, which will be in the focus of this study. On

first sight, it is not clear why I should find an effect on change in lending activity to firms, and in the second round, adverse or positive effects on competitors. However, theory and empirical findings from the zombie lending literature point to specificities of weak banks, which makes them more sensitive to unexpected windfall gains. A bank that held an eligible SMP asset could benefit in various ways. Either it sold the asset to the ECB and thereby obtained liquid reserves. Or it could benefit from a valuation effect. Further, banks could benefit from expectation changes on the intervention of the ECB, which made their sovereign bond holdings less risky. There are two building blocks why I expect to see a change in behavior for a specific group of banks: First, according to the zombie lending literature, lowly capitalized banks have an incentive to continue lending to troubled borrowers and thereby bet on the borrower's revival to avoid a loss to the own balance sheet. An unexpected windfall gain might enable the bank to do so. Second, according to Diamond (2001), the size of the recapitalization is decisive to a change in behavior of a bank. It is especially these *small* windfall gains which lead to a gamble for resurrection instead of a healthy consolidation of banks' balance sheets Keuschnigg and Kogler (2017); Giannetti and Simonov (2013). Hence, I expect to find an increase in lending to highly leveraged firms that are connected to weak banks.

Regarding the effects on surrounding, untreated firms, the expected effect is not clear. Either, firms operating in the same region benefit as the LSAP prevents a loss in aggregate demand (Jaskowski, 2015). Or, firms in the surroundings lose out as their competitors receive subsidies. The result might

also hinge on the healthiness of the competing firms. Strong firms might be less sensitive to subsidies to unhealthy competitors in their surroundings than weak, or highly leveraged, firms which depend strongly on refinancing opportunities. Further, the effect might also hinge on the economic strength in the region - in times of tight labor markets, lay-offs in one firm might be absorbed quickly, and hence LSAP are not needed to stabilize aggregate demand. In such a situation, in which competition among firms is stronger, competitors who do not benefit from the program might lose out. In contrast, if labor markets are loose, competitors might benefit from a prevention of a decrease in aggregate demand, and the LSAP is even beneficial to them.

There are two papers which are tightly related to my research. Jiménez et al. (2014) study the effect of conventional monetary policy and show that low interest rates induce zombie lending in Spain. In contrast to their paper, my work is on the impact of unconventional monetary policy in terms of unexpected windfall gains by banks exposed to risky sovereign debt.

Acharya et al. (2017) look at unconventional monetary policy and find that the Outright Monetary Transaction (OMT) announcement 2012 encouraged undercapitalized banks to lend to troubled borrowers in the EU. My paper differs in three important aspects from Acharya et al. (2017). First, their sample is restricted to firms connected to large banks that were included in the EBA stress testing. which are 119 in Germany However, small and medium enterprises (SMEs) are mainly financed by regional banks in Germany (Sparkassen and Giroverband e. V. (2016)). Second, by focusing on a sample of large banks only, Acharya et al. (2017) have difficulty to establish

causal links as especially these banks might have loaded up with risky government bonds (Abbassi et al. (2016)). In contrast, by looking at the first LSAP of the ECB, the SMP, and applying restrictions to the sample (see below), my paper can more clearly identify the UMP shock. Third, my paper differs in that I look at the tails of then of weak banks, and also my focus lies on highly leveraged firms instead of the interest coverage ratio, which also entails the problem that zombie firms might receive subsidized loans, i.e. lower interest payment obligations.

My analyses show that weak banks exhibit increased lending behavior as a response to the SMP to medium and highly leveraged firms. Highly levered firms operating in regions in which many of their competitors benefit from the SMP show lower investment activities. Also, they shrink in size in terms of number of employees. The program seems to induce a crowding-out effect, however, a crowding-out of the bad guys. In regions with low unemployment rates, the effect turns around. When labor markets are tight lowly leveraged firms invest less the higher the share of beneficiaries in the same region. LSAP show negative unintended side effects if competition for resources is high among firms. For firms operating in the same industries, I do not find any change in investment behavior conditional on the beneficiaries in the same industry.

The intended consequences of the SMP are already well researched. Ghysels et al. (2016), Eser and Schwaab (2016) and De Pooter et al. (2018) find that government bond yields were lowered with the asset purchases. In their macroeconomic analysis Casiraghi et al. (2016) find a positive impact on the

Italian real economy.

2 Data

2.1 Monetary policy shock and bank data

The SMP was the first large scale asset purchase program that was conducted in the Eurozone. The ECB implemented the programme in May 2010 and it lasted until September 2012. The ECB started purchasing Portuguese, Greek and Irish sovereign bonds and extended the programme in 2011 to Spanish and Italian sovereign debt. They also purchased marketable debt of private entities incorporated in the Euro area, however, as will be described in Section 2.2, this will not affect firms in the sample of this paper which comprises only SMEs. In total, the programme had a notional volume of 218 Billion Euro.

The SMP provides a good testing ground for establishing causal links between LSAPs and lending to leveraged firms. First, in contrast to the Fed, the ECB was hesitating to intervene into financial markets until the SMP was established. Hence, the programme was not expected by market participants (Stolz and Wedow, 2010). This condition is crucial to avoid self-selection into treatment group of especially risk-prone banks which loaded up with crisis bonds. Second, the SMP was a response to the sovereign debt crisis in Southern European countries and Ireland, and not to events in Germany. Third, the programme aimed at lowering government bond yields and not

to stimulate credit growth. The ECB confirms this in their announcement of the programme, and shows actions to keep aggregate reserves holdings stable by implementing sterilization measures. If there are changes in lending behaviour in Germany as a response to the SMP, they are unintended side effects as they were neither the aim nor the reason for the programme.

Data on the SMP purchases comes from the ECB and is combined with Bundesbank data on sovereign bond holdings as in Koetter et al. (2017). The data provides information on whether a bank held SMP eligible assets on a yearly basis. A bank is defined as treated if it held SMP assets in all three programme years 2010, 2011 and 2012. The sample covers 1,033 German savings and cooperative banks of which 6.87% are treated. Information on the bank level comes from Bureau van Dijk's bankscope dataset. In the analysis, only savings and cooperative banks are included as they do not have a trading desk and the propensity that they bought risky sovereign debt in order to bet on the intervention of the ECB is lower. To verify that these banks are not specialized in securities trading, I use the method of Abbassi et al. (2016) to approximate a bank's proficiency in trading. They assume that banks which are members of the German trading platform Eurex Exchange have a trading desk. There are four Sparkassen in Germany which are members of the Eurex, however, all four Sparkassen are not in my sample.[1] 69.05% bank links in the final sample are to savings or cooperative banks, which shows the strong reliance of SMEs on regional banks. In case of duplicates, bank-year observations which are consolidated are dropped to avoid double reporting.

[1]Kreissparkasse Ludwigsburg, Sparkasse Pforzheim, Kreissparkasse Köln and Hamburger Sparkasse

I follow other authors and use the equity ratio of the bank as a proxy for the bank's weakness (Jiménez et al., 2014; Schivardi et al., 2017; Acharya et al., 2017; Peek and Rosengren, 2005). In contrast to the previous literature, I define a bank as weak if it was among the lower 10% of the distribution of banks' equity ratios in the pre crisis and pre treatment year 2007. The threshold is chosen as the margins of the distribution are of interest. 15.95% of firm-year observations are linked to a weak bank, as can be seen in Table 1, i.e. weak banks are slightly larger in terms of customer base.

2.2 Firm data

To evaluate the impact of UMP on firm's indebtedness, the following analysis is conducted on the firm level. The Dafne dataset by Bureau van Dijk provides information on the firms' bank links. To approximate the lending of the bank to the firm, I only use firms with a single bank relationship and assume that loans on the firm's balance sheet stem from their only bank. 59.05% percent of firms in the dataset have a single bank link. Firm balance sheet data is added from Amadeus by Bureau van Dijk. In the analysis, only SMEs are included due to their pivotal role as an engine of economic growth, employment and economic stability in Germany (BMWi, 2018). Further, it is essential to rule out confounding factors such as other purchases of securities of the ECB at the same time. SMEs do not tap capital markets and usually do not issue bonds but are bank reliant.

Further, SMEs often maintain relationship lending, i.e. repeated business relationships with the same bank (Sparkassen and Giroverband e. V., 2016).

For instance Behr et al. (2013) find that relationship lending is less prone to business cycles, and Elsas and Krahnen (1998) find that relationship lenders support troubled borrowers in liquidity needs. Only firms are included which do not change their bank relationship in the sample period. Tests within these stable relationships are conservative and results meaningful. To identify SMEs, the definition of the European Commission (EC) is employed: firms must have less than 250 employees, and either their turnover is less or equal 50 Million Euro, or their total assets are less or equal 43 million Euros (European Commission, 2018). Further, industry sectors that are highly subsidized are excluded (agriculture, fishing and forestry), or which are closely linked to the state (health industry, education, and public administration).

The dataset comprises 396,908 firms, and 1,325,087 firm-year observations of which 9.67% are defined as treated. For detailed description of data cleaning, see Section C in the Appendix. The analyses are pursued on a sample for which the dependent variable of the main regression, loan holdings, is available. The more balanced sample comprises 73,703 firms, or 331,872 firm-year observations.

I use firms' leverage ratio in the pre crisis and pre treatment years 2006 and 2007 following Schivardi et al. (2017) when they claim to measure firms' default risk according to their leverage ratio. I define leverage as current liabilities plus non-current liabilities over total assets. If the leverage ratio is larger than one, I set the leverage ratio to a missing as this must be due to reporting errors. Still, the share of firms with leverage ratio equal to one is very large (9.56% of firm-year observations show a leverage ratio of one).

To avoid that outliers drive my results due to reporting errors, all analyses are conducted without firms with leverage ratio equal to one in the pre crisis and pre treatment year 2007. If a highly leveraged firm is defined as one belonging to the highest 10% percentile in the distribution of leverage ratios, then 5.85% of firms linked to strong banks and 5.72% of firms linked to weak banks are highly leveraged. Hence, there is no clustering of highly leveraged borrowers at weak banks.

It could be that results are driven by systematically lower or higher leverage ratios in certain industries. Table 3 shows the mean leverage across industries and indicates that leverage ratios do not systematically differ across industry. There is only one industry with very low leverage ratios, which is Management of Companies. In robustness checks, this sector has to be excluded.

In the first part of the analysis, I focus on the lending behavior of banks to firms. As dependent variable, I use the log change of loan holdings at the firm. In the second part of the analysis, I assess the impact on surrounding firms in the same region and look at their investments, measured as log change of fixed assets less depreciation, as well as firm size measured according to the log of total numbers of employees. Table 1 reports summary statistics on all variables in levels and in changes. I winsorize financials at 1% and 99% of the distribution before they are log transformed.

– Insert Table 1 around here –

Summary statistics are based on the sample of firms included in the main

regression analysis with the change of loans as dependent variable. The median firm in the sample has a leverage ratio of 64.3%, which is similar to what others find (e.g Storz et al. (2017) show for their sample of SMEs in several Euro countries a median leverage ratio of 61.5%). The median firm has total asset size of 374,214 Euro (reported in logs in Table 1), showing that the analysis is on the very small firms, and has a median age of 14 years. For the baseline analysis, in which the change of loans is in the focus, I make use of 331,872 firm-year observations.

In a differences-in-differences setting, the parallel trend assumption has to be fulfilled, which means that treatment and control group should have parallel trends in the pre period. Table 2 reports results from t-tests on levels as well as changes of variables used as dependent variables in the regression analyses. It shows results for tests on the differences between treatment and control group for the pre and the post period respectively, as well as the differences-in- differences.

– Insert Table 2 around here –

Treated firms have larger loan holdings, have lower fixed assets and are slightly larger in terms of number of employees in the pre period. However, in order for the parallel trend assumption to hold, *trends* in dependent variables have to be parallel. T-tests on mean change of the respective variables tests the assumption. Neither change of log loans, not investments, nor change in employment show statistically significant differences between treatment and control group in the pre period. The number of observations is significantly

reduced when using *Investments*, as this encompasses depreciations, which is often reported as missing.

Figure 1 gives a first impression on the development of average loan growth of firms connected to strong banks (left panel) and firms connected to weak banks (right panel) over the sample period 2007-2013. Loan growth is measured on the firm level with loan level data from the firms' balance sheets.

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For firms connected to strong banks, treated and control firms show similar average loan growth rates until 2011. In 2012, treated firms (dotted line) show slightly higher loan growth rates than non-treated firms. Firms connected to weak banks show a sharp increase in the growth of loans on their balance sheet in 2010 if they were treated. The growth rate falls back in 2011 on a similar level as the non-treated group. This is in line with observations in the zombie lending literature: treated firms connected to weak banks show a positive reaction in their loan growth, which differs from borrowers connected to strong banks. These are merely descriptive, non-parametric statistics. In the analysis, it is necessary to control for regional and industry demand shocks as well as unobservables on the firm level, before drawing conclusions. Also, in the following I will distinguish between lending to lowly and highly leveraged firms.

3 Results

3.1 Lending to treated firms

The impact of the SMP can be best analyzed in a differences-in-differences setting. I estimate the following model, which will be extended in the following analyses:

$$Y_{it} = \alpha_i + \alpha_{rt} + \alpha_{kt} + \gamma SMP_i \times Post_t + \cdots + \epsilon_{it} \tag{1}$$

The dependent variable is the log difference of loans on firm i's balance sheet. Time series are collapsed on the firm level into mean of pre and mean of post period for firm i to avoid serial correlation (Bertrand et al., 2004). The estimation includes a differences-in-differences term, where SMP is a binary variable and indicates whether firm i is connected to a bank that benefited from the SMP in all three treatment years 2010, 2011 and 2012. The dummy variable $Post$ equals 0 in the pre period 2007-2009, and 1 in the post period 2010-2013.

To ensure that results are not driven by demand shocks on the regional or industry level, as well as by time invariant unobservables on the firm level, an extensive set of fixed effects are included. Firm fixed effects α_i, region-time fixed effects α_{rt} based on two-digit zip codes which renders 95 regions in the baseline sample, and industry-time fixed effects α_{kt}, based on two-digit NAICS codes, which renders 19 different industries in the baseline sample, control for region specific or industry specific demand shocks. Table 3 in the Appendix shows the distribution of firms across industries. Bank fixed

effects are nested within firm fixed effects as solely firms which do not change their bank are included in the estimation. The bank level is the highest level of variation on the right-hand side, because the treatment variable varies on the bank level. Therefore, standard errors are clustered on the bank level. Column I in Table 4 shows the result.

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Firms connected to a bank that benefited from the program show on average higher loan growth in the post period than other firms; γ is positive and statistically significant on the 10% level. The zombie lending literature predicts a change in lending activities especially by weak banks. To test whether weakly capitalized banks are responsible for the increased lending activity in the post period to firms connected to treated banks, I augment the model as shown in equation 2 by interacting the differences-in-differences term with an indicator *Weak bank*, which equals 1 if firm i is connected to a weakly capitalized bank and equals 0 if firm i is connected to a strongly capitalized bank measured in the pre crisis and pre treatment year 2007. The estimation equation includes also all compositional terms of the triple differences-in-differences term:

$$Y_{it} = \alpha_i + \alpha_{rt} + \alpha_{kt} + \gamma_1 SMP_i \times Post_t + \gamma_2 SMP_i \times Post_t \times \text{Weak bank}_i + \cdots + \epsilon_{it} \tag{2}$$

Column II in Table 4 shows the result. γ_2 is positive and statistically significant at the 5% level, whereas γ_1 loses its statistical significance and cannot be distinguished from zero. The results confirm conjectures from the zombie

lending literature. The increase in lending activities from the SMP program can be attributed to weakly capitalized banks. I augment the model further to test who is benefiting from increased lending activities by weak banks by estimating a quadruple differences-in-differences estimation as shown in equation 3:

$$Y_{it} = \alpha_i + \alpha_{rt} + \alpha_{kt} + \gamma SMP_i \times Post_t \times \text{Weak bank}_i \times \text{Weak firm}_i + \cdots + \epsilon_{it} \tag{3}$$

Weak firm is the continuous leverage ratio of firm i in the pre crisis and pre treatment years 2006/2007. I derive the marginal effects of SMP conditional on the post period and on a continuum of firm leverage ratios for the group of firms connected to weak banks as well as the group of firms connected to strong banks separately. For sake of completeness, I estimate first a triple differences-in-differences estimation in which the differences-in-differences term $SMP_i \times Post_t$ is interacted with *Weak firm* to find out whether there are differences in lending activities vis-a-vis weak firms on average. Results in column III show that this is not the case. There is only a marginal difference for the averagely leveraged firm, which Figure 2 confirms for different levels of firm leverage. Column IV finally shows the results from estimating equation 3. From first sight, regression results do not show effects for the averagly leveraged firm. However, Figure 3 and 4 show the results for the impact of the SMP on loan growth for strong and weak banks separately conditional on the leverage ratio of firms pre treatment and pre crisis.

– Insert Figure 3 around here –

– Insert Figure 4 around here –

Figure 3 shows the marginal effect of the treatment in the post period on firms linked to a strong bank. A histogram with the distribution of average leverage ratios of firms in years 2006/2007 is included. The treatment has no effect on the loan growth of firms connected to strong banks independent of their leverage ratio. This is in line with theory which suggests that small windfall gains do not lead to change in behavior of strong banks.

Figure 4 shows a strong positive effect of the SMP on firms linked to weak banks in the post period. The effect is positive and statistically significant especially for medium to highly leveraged firms, though the effect vanishes for firms at the very top of the leverage distribution. For the average firm with a leverage ratio of 0.621 in 2006/2007, the marginal effect of the treatment in the post period equals 0.141, that implies a higher loan growth of 14.1%. The results indicate that it is the weak banks which make use of their windfall gains and support especially their medium and highly leveraged borrowers. Though the highest leveraged borrowers do not show a statistically significantly higher loan growth.

Estimation equations are estimated using collapsed data in the vein of (Bertrand et al., 2004). For robustness checks, Figure A.1 and Figure A.2 show results for estimation equation 3 for non-collapsed data. The results are very similar – lending activities of strong banks does not change after the treatment, but lending growth of weak banks does increase. Now medium, highly and also very highly leveraged firms seem to be mostly affected by the increase in lending activity.

3.2 Spill-over effects

A change in lending behavior vis-à-vis highly leveraged firms can be viewed problematic in itself. However, it is of a concern if there are adverse consequences for competing firms which do not benefit from eased access to lending. To assess the effect of the SMP treatment on firms operating in the same region or in the same industry, I estimate the following model for firms which are themselves not affected of the program:

$$Y_{it} = \alpha_i + \alpha_{rt/kt} + \gamma \times Post_t \times \text{SMPshare}_{r/k} \times \text{Weak firm}_i + \cdots + \epsilon_{it} \quad (4)$$

The dependent variable Y_{it} measures investments of firm i in year t, and log of employment. The triple interaction term composes of an indicator variable $Post_t$ which equals 0 in the years 2007-2009 and 1 in the years 2010-2013, the share of firms in the same region r or industry k, respectively, that are treated by the SMP, $SMPshare$, and a continuous measure of firm weakness which is the firm's leverage ratio in the years 2006 and 2007, $Weakfirm_i$. The regression includes also all compositional terms of the triple differences-in-differences term. It is supplemented with firm fixed effects (α_i), and either industry-time fixed effects (α_{kt}) for comparisons across regions, or region-time fixed effects for comparisons across industries (α_{rt}). Standard errors are clustered on the region level or industry level, respectively. Table 5 shows the result for the average SMP share.

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Column I and II show results for the impact on investments as a measure of firm performance of non-treated firms. The regression in column I includes firm and time fixed effects, regression underlying column II includes additionally Industry–Time fixed effects. As both, the indicator for firm weakness, the leverage ratio of firms pre treatment and pre crisis, and the treatment variable $SMPshare$ are a continuous variables, marginal effects have to be assessed conditional on various levels of these variables. Figure 5 shows the results for two groups of firms: the lower quartile (light grey) versus the higher quartile (dark grey) of firms in terms of their leverage ratios conditional on $SMPshare$ in their region.

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– Insert Figure 6 around here –

It can be seen in Figure 5 that lowly leveraged firms do not show a change in their investment behavior no matter how large the exposure of firms in the same region to the SMP. Highly leveraged firms show divestment behavior the higher the share of treated firms in their surroundings. However, the difference between the two groups seems not to be significant. Figure 6 shows the impact on investment for the 10% lowest (light grey) and 10% highest leveraged firms in the sample. Now the difference between the two groups becomes very pronounced. Highly leveraged firms show clearly lower investments the higher the share of SMP beneficiaries in their surrounding they operate in. It seems that the SMP produces a crowding-out effect of the weakest competitors. Firms which are highly leveraged might be the

first who lose out if their competitors receive a subsidy. Weak firms might compete especially with weak firms and thereby are also hit more severely if their competitors receive benefits.

Column III and IV show results for the impact on the log number of employees as dependent variables to measure firm growth, again for the sample of non-treated firms, and Figures 7 and 8 show again marginal effects for different leveraged firms.

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Again, when looking at firms which are among the lowest quartile in the distribution of leverage ratios, I do not find an effect. Firms in the highest quartile face a negative effect on their employment the higher the share of treated firms in their surroundings as can be seen in Figure 7. Figure 8 shows the effect for the lowest 10% leveraged and highest 10 % leveraged, respectively. As before, for these two groups also the differences are statistically significant if the share of treated firms in the surroundings in high. Hence, highly leveraged firms do not only lose out in terms of investment, but also shrink in size in terms of number of employees. Again, it is the weakest firms in the sample which face a disadvantage from their competitors being subsidized.

The effect on surrounding firms might also depend on characteristics of the region. If economic growth is strong, unemployment rate is low and the region prospers, firms might be faced with higher competition for resources.

Demand for employment and capital is higher and therefore resources might be scarce. In such an environment, the benefits rendering a marginal advantage to one firm might especially hurt competitors who do not get subsidized. In order to measure differential effects between regions with high and low unemployment rates, I estimate the following model:

$$Y_{it} = \alpha_i + \alpha_{rt/kt} + \gamma \times Post_t \times \text{SMPshare}_{r/k} \times \text{Weak firm}_i \times \text{Low\_UR}_{r/k} + \cdots + \epsilon_{it} \tag{5}$$

The estimation equation 5 includes further a binary variable Low_UR which equals 1 for regions in which the unemployment rate was below 5% on average in the pre treatment years 2007–2009, and 0 otherwise. I chose the threshold of 5%, as this is a reasonable low unemplyoment rate to consider a region to be prospering. Further, 10% of firms are operating in this low unemployment environment, consistent with previous thresholds. The result can be seen in Figure 9.

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The negative effect on investments for highly leveraged firms, and the null-effect for lowly leveraged firms turns around. Figure 9 shows the effect on lowly leveraged firms in regions with a low average unemployment rate in the pre period. It is the lowly leveraged firms now which are affected. The higher the share of treated firms in the same region in which unemployment rate is very low, the lower investments for lowly leveraged firms. For highly leveraged firms, I do not find an effect anymore.

There can be two reasons for the turnaround of the effect. First, in an environment of low unemployment rate, competition among firms for resources is higher. Benefits to the weak firms in terms of subsidized credit can have adverse effects not only on the bad, but also on the healthy competitors.

Second, in times of economic prosperity, there might be a problem of adverse selection: Banks do not monitor as good as before, and weak firms obtain even more lending and can crowd-out actual good borrowers. The SMP then strengthens this effect.

In total, I do not find effects for firms operating in the same industry conditional on the share of treated firms in the same industry. The geographical proximity seems to be decisive here. It is possible that this is the case because SMEs operate more locally, and therefore firms close by are rather decisive for their own performance. Also, the economic conditions within their region is more important than for large enterprises.

4 Conclusion

Does loose monetary policy lead to unintended side-effects in terms of increased lending activities to already highly leveraged firms? I find that especially medium to highly leveraged firms which are connected to weak banks show higher loan growth. To answer the question whether this is problematic, I assess the impact on firms operating in the same region or industry.

Results show that it is the highly leveraged firms in the geographical surroundings which do not directly benefit from the program via their bank, are

the ones who lose out. They show lower investments and also adverse effects in terms of employment. The effect turns around for regions with favorable economic conditions, which entail higher competition for resources between firms, approximated by the average unemployment rate in the pre period. Now the lowly leveraged firms are disadvantaged if they are surrounded by many competitors which benefited from the asset purchase program.

The results show that LSAPs can have crowding-out effects on the bad guys in times where LSAPs can stabilize aggregate demand, and thereby even foster market clearing processes. In times of high competition among firms when unemployment rates are low, firms with moderate leverage ratios, which can be defined as healthy, lose out and reduce investment and employment.

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A Tables

Table 1: Summary Statistics

This table reports summary statistics for a sample of 71,874 small and medium German firms according to the definition of SMEs by the European Commission (2018). *Leverage* is defined as current liabilities plus non-current liabilities over total assets, *Leverage_0607*, is the average leverage ratio in 2006 and 2007. The following variables are in logs (EUR): *Loans* is loan holdings, *LongDebt* is long-term debt, *CurrentLiab* is current liabilities and *NoncurrentLiab* is non-current liabilities. *Age* is firm age calculated as the current year minus the year of incorporation. ΔLoans and ΔLongDebt are first differences of log variables. ΔLeverage is the first differences of leverage ratio. As performance indicators, the following variables are used: *labour prod.*, defined as turnover per employee, *return* which measures profitability according to return on total assets, *Investments* defined as log change of fixed assets less depreciation, and *total prod.* which is approximated according to Caballero et al. (2008) as log(sales) - 1/3*log(fixed assets) -2/3*log(number of employees). *Weak_bank* is a binary variable and equals 1 if the bank was among the lowest decile of the equity ratio of all banks in the sample in the year 2007 (reported on firm level), and 0 otherwise. *Nonzombie* is an indicator variable equalling 1 if firm i is non-treated and not part of the 10% mostly leveraged firms in the pre period. SMP is the binary treatment variable and equals 1 if the bank, the firm is linked to, held eligible SMP assets in all three treatment years 2010, 2011 and 2012. It equals 0 for banks that never held any SMP eligible asset. $SMPshare, region$ shows the share of firms treated in the same region. $SMPshare, industry$ shows the share of firms treated in the same industry. *Post* equals 0 in pre period 2007-2009 and 1 in period 2010-2013. All continuous variables are winsorized at the 1% and 99%.

	N	mean	p50	sd	min	max
Levels						
Leverage	326,619	0.605	0.643	0.297	0.000	1.000
Leverage_0607	331,872	0.622	0.668	0.278	0.000	1.000
Loans	331,872	0.864	0.000	3.071	0.000	15.494
LongDebt	328,414	6.241	8.771	5.892	0.000	16.914
CurrentLiab	331,872	11.197	11.395	2.169	0.000	16.792
NoncurrentLiab	331,872	10.827	11.106	2.491	0.000	17.216
Age	331,872	18.600	14.000	18.342	1.000	423.000
Changes						
ΔLoans	331,872	0.003	0.000	2.219	-15.494	15.494
ΔLeverage	325,993	0.042	-0.003	0.444	-0.797	3.443
ΔLongDebt	327,022	0.004	0.000	3.455	-16.914	16.914
Performance						
Labour prod.	68,799	0.247	0.115	0.486	0.010	4.191
Return	36,636	8.134	5.320	16.008	-41. 580	62.420
Investments	33,788	11.013	11.082	2.167	-5.940	24.523
Total prod.	69,230	8.816	8.672	1.087	6.075	12.994
Indicators						
Weak_bank	331,872	0.153	0.000	0.360	0.000	1.000
Nonzombie	300,971	0.889	1.000	0.314	0.000	1.000
SMP	331,872	0.104	0.000	0.305	0.000	1.000
SMPshare, region	331,872	0.104	0.034	0.165	0.000	0.767
SMPshare, industry	331,872	0.102	0.097	0.014	0.065	0.176
Post	331,872	0.539	1.000	0.498	0.000	1.000

Table 2: Test on parallel trend assumption

This table shows t-tests on mean levels and mean changes of firm level variables within the pre and post period between treated and control groups. The last two columns report the differences-in-differences tests between the means of the two groups over both periods. The sample covers the years 2007-2009 in the pre period and 2010-2013 in the post period. The table reports tests on the following firm-level variables: *Loans* is the log of loan holdings (in EUR) of firm i, *FixedAssets* are log of fixed assets, *Employment* is log of number of employees, Δ*Loans* is log difference of loans (in EUR), *Investments* is the log differences of fixed assets minus depreciation (in EUR) and Δ*Employment* is the log differences of number of employees. All variables are winsorized before transformed into logs at the top and bottom 1% percentile. *, **, *** indicate significant coefficients at the 10%, 5%, and 1% level, respectively.

		Pre period				Post period					
	N	Non-treated	Treated	Diff	SE	Non-treated	Treated	Diff	SE	DiD	SE
Loans	331,872	0.684	0.804	0.119***	0.026	0.993	1.124	0.130***	0.024	0.011	0.035
Fixed Assets	331,872	10.170	10.120	-0.050*	0.030	10.250	10.200	-0.055**	0.028	-0.005	0.041
Employment	131,592	1.930	1.994	0.065**	0.026	2.014	2.004	-0.011	0.013	-0.075**	0.030
Δ*Loans*	331,872	-0.028	-0.038	-0.011	0.019	0.028	0.054	0.026	0.017	0.037	0.025
Investments	33,788	11.021	11.0170	-0.004	0.058	11.015	10.953	-0.061	0.047	-0.057	0.075
Δ*Employment*	91,594	0.014	0.016	0.002	0.002	0.020	0.019	-0.001	0.002	-0.003	0.005

Table 3: Distribution across industries

This table shows the distribution across industries of firm-year observations in the baseline sample. The sample comprises 73,703 small and medium German firms according to the definition of SMEs by the European Commission and covers the period 2007-2013.

NACIS code	Name	Frequency	Percent	Cumulative	Mean Leverage_0607
21	Mining	860	0.26	0.26	0.685
22	Utilities	3,616	1.09	1.35	0.632
23	Construction	52,787	15.9	17.25	0.688
31	Manufacturing	5,802	1.75	19	0.653
32	Manufacturing	10,650	3.21	22.21	0.644
33	Manufacturing	31,475	9.48	31.69	0.641
42	Wholesale Trade	42,504	12.8	44.49	0.670
44	Retail Trade	18,625	5.61	50.1	0.691
45	Retail Trade	7,087	2.13	52.24	0.662
48	Transportation and Warehousing	12,976	3.91	56.15	0.687
49	Transportation and Warehousing	754	0.23	56.37	0.644
51	Information	4,481	1.35	57.72	0.609
53	Real Estate Rental and Leasing	26,592	8.01	65.74	0.629
54	Professional, Scientific and Technical Services	47,854	14.42	80.15	0.583
55	Management of Companies and Enterprises	21,542	6.49	86.64	0.274
56	Administrative Support and Waste Management and Remediation Services	19,595	5.9	92.54	0.627
71	Arts, Entertainment, and Recreation	4,512	1.36	93.9	0.609
72	Accomodation and Food Services	7,417	2.23	96.14	0.682
81	Other services (except Public Administration)	12,822	3.86	100	0.602
Total		331,951	100		0.622

Table 4: Results from differences-in-differences analyses: Effects on lending

This table reports results from differences-in-differences estimations. The model builds up from a standard difference-in-differences model in column I to a quadruple difference-in-differences estimation in column IV as in the following: $Y_{it} = \alpha_i + \alpha_{rt} + \alpha_{kt} + \gamma SMP_i \times Post_t \times \text{Weak bank}_i \times \text{Weak firm}_i + \cdots + \epsilon_{it}$. Dependent variable is $\Delta Loan$, which is the log differences in loans (in EUR). SMP is the binary treatment variable and equals 1 if the bank, the firm is linked to, held eligible SMP assets in all three treatment years 2010, 2011 and 2012. It equals 0 for banks that never held any SMP eligible asset. *Post* is a binary variable which equals 0 in the years 2007-2009 and 1 in the years 2010-2013. *Weak_bank* is a binary variable and equals 1 if the bank was among the lowest decile of the equity ratio of all banks in the sample in the year 2007, and 0 otherwise. $Weak\_firm$ is defined as average firm leverage for the years 2006/2007. All continuous variables are winsorized at the 1% and 99%. The regressions include further firm fixed effects, region*period fixed effects, industry*period fixed effects. Standard errors are clustered on the bank level. *, **, *** indicate significant coefficients at the 10%, 5%, and 1% level, respectively.

	(1) Δloan	(2) Δloan	(3) Δloan	(4) Δloan
SMP*Post	0.051*	0.015	0.050	0.055
	(0.030)	(0.036)	(0.057)	(0.066)
Post*Weak_bank		-0.017		-0.043
		(0.024)		(0.049)
SMP*Post*Weak_bank		0.127**		0.037
		(0.060)		(0.137)
Post*Weak_firm			0.052*	0.046
			(0.031)	(0.034)
SMP*Post*Weak_firm			0.001	-0.064
			(0.091)	(0.104)
Post*Weak_bank*Weak_firm				0.043
				(0.074)
SMP*Post*Weak_bank*Weak_firm				0.145
				(0.233)
Observations	115,446	115,446	115,446	115,446
R-squared	0.405	0.405	0.405	0.405
Firm FE	Yes	Yes	Yes	Yes
Region*Time FE	Yes	Yes	Yes	Yes
Industry*Time FE	Yes	Yes	Yes	Yes

Table 5: Results from differences-in-differences analyses: Spill-over effects

This table reports results from a triple differences-in-differences estimation as in the following: $Y_{it} = \alpha_i + \alpha_{rt} + \gamma \times Post_t \times \text{SMPshare}_{ri} \times \text{Weak firm}_i + \cdots + \epsilon_{it}$. Dependent variables are investments, defined as log differences of fixed assets less depreciation, and employment, defined as log number of employees. *Post* is a binary variable which equals 0 in the years 2007-2009 and 1 in the years 2010-2013. $SMPshare$ is the share of treated firms in the same region. A firm is defined as treated if the firm's bank held eligible SMP assets in all three treatment years 2010–2012. $Weak\_firm$ is defined as average firm leverage for the years 2006/2007. All continuous variables are winsorized at the 1% and 99%. The regressions reported in columns I and III include further firm fixed effect and time fixed effects. Regressions reported in columns II and IV include firm fixed effects and industry–time fixed effects. Standard errors are clustered on the regional level. *, **, *** indicate significant coefficients at the 10%, 5%, and 1% level, respectively.

	(1) investments	(2) investments	(3) employment	(4) employment
Post*Weak_firm	0.009	-0.016	0.006	-0.005
	(0.070)	(0.075)	(0.018)	(0.019)
Post*SMPshare	0.654**	0.700***	0.110	0.108
	(0.260)	(0.259)	(0.085)	(0.080)
Post*Weak_firm*SMPshare	-1.355***	-1.444***	-0.275*	-0.269**
	(0.369)	(0.366)	(0.143)	(0.134)
Observations	27,257	27,257	106,081	106,081
R-squared	0.874	0.875	0.977	0.977
Firm FE	Yes	Yes	Yes	Yes
Time FE	Yes	No	Yes	No
Industry*Time FE	No	Yes	No	Yes

Table 6: Variable Descriptions

Variable	Unit	Description
leverage	Ratio	Current plus non-current liabilities over total assets of firms. Source: Amadeus.
leverage_0607	Ratio	Mean of leverage ratio of firms in years 2006 and 2007. Source: Amadeus.
loans, log	EUR	Log of loans in EUR. Loans are winsorized at lower and upper 1%. Source: Amadeus.
ltdb, log	EUR	Log of long term debt in EUR. Long term debt is winsorized at lower and upper 1%. Source: Amadeus.
culi, log	EUR	Log of current liabilities in EUR. Current liabilities are winsorized at lower and upper 1%. Source: Amadeus.
ncli, log	EUR	Log of non-current liabilities in EUR. Non-current liabilities are winsorized at lower and upper 1%. Source: Amadeus.
age	Years	Current year minus year of incoporation. Source: Amadeus.
Changes		
leverage, change	%	First differences of leverage.
loans, log change	%	Log difference of loans.
ltdb, log change	%	Log difference of long term debt.
culi, log change	%	Log difference of current liabilities.
ncli, log change	%	Log difference of non-current lieabilities.
Performance		
investments	EUR	Log differences of fixed assets less depreciations. Winsorized at lower and upper 1%. Source: Amadeus. Own calculations.
empl, log		Log of number of employees. Source: Amadeus.
Indicators		
weak_bank	0/1	Equals 1 if a bank's equity ratio was among lowest 10% of distribution in 2007. Source: Bankscope.
Nozombie	0/1	Equals 1 if firm is not among 10% most leveraged firms in pre period and is not treated.
Post	0/1	Equals 0 in pre period 2007-2009 and equals 1 in post period 2010-2013.
Treatment		
SMP	0/1	Equals 1 if bank held an SMP assets in all three treatment years 2010, 2011 and 2012. Source: Bundesbank and ECB.
SMPshare	Ratio	Share of firms in same region or same industry which are treated by SMP.

B Figures

B.1 Effect on lending

Figure 1: Loan growth over time for firms connected to strong and weak banks

This figure shows the development of means of **log differences of loans** (in EUR) on the balance sheet of firms which are linked to a strong bank (left-hand side) or linked to a weak bank (right-hand side). A bank is defined as weak if it was among the lower decile of distribution the equity ratios of all banks in the sample in the year 2007. The sample covers the years 2007-2013 and includes 71,874 small and medium German firms according to the definition of SMEs by the European Commission, or 322,526 firm-year observations. Loan holdings are winsorized at the top and bottom 1% before the log transformation.

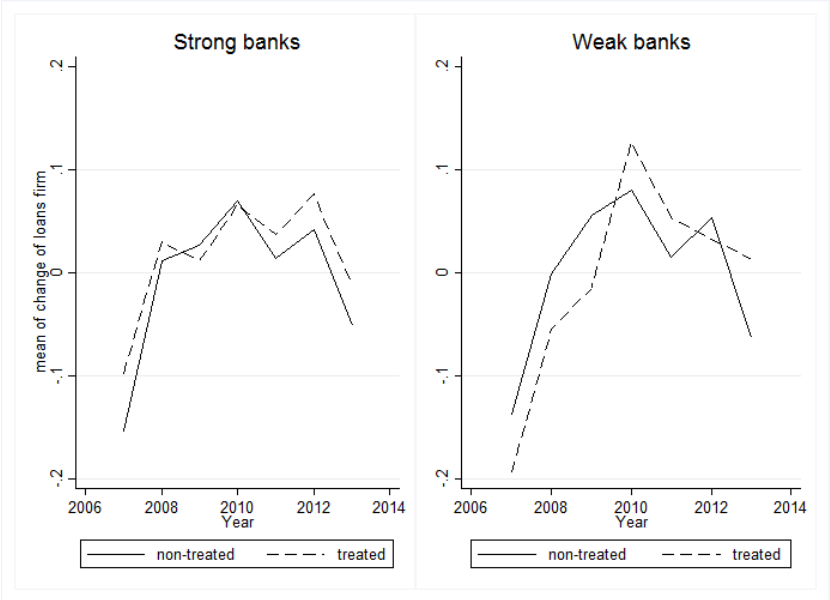


Figure 2: Marginal effects of treatment for all firms

This figure shows marginal effects of the treatment (SMP) conditional on the post period on the **log differences of loans** (in EUR) for firms connected to strong or weak banks. Time series are collapsed on the firm level into one observation in the pre (2007-2009) and post (2010-2013) period, respectively. A bank is defined as weak if it was among the lowest decile of the distribution of the equity ratios of all banks in the sample in the year 2007, and strong otherwise. The sample covers 57,723 small and medium German firms according to the definition of SMEs by the European Commission, or 115,446 firm-year observations (two observations per firm). The underlying regression analysis is a triple differences-in-differences model, including firm fixed effects, industry-period and region-period fixed effects. Standard errors are clustered on the bank level. The grey area indicates confidence intervals at the 10% level. The histogram shows the distribution of leverage ratios during the years 2006/2007 for the underlying sample.

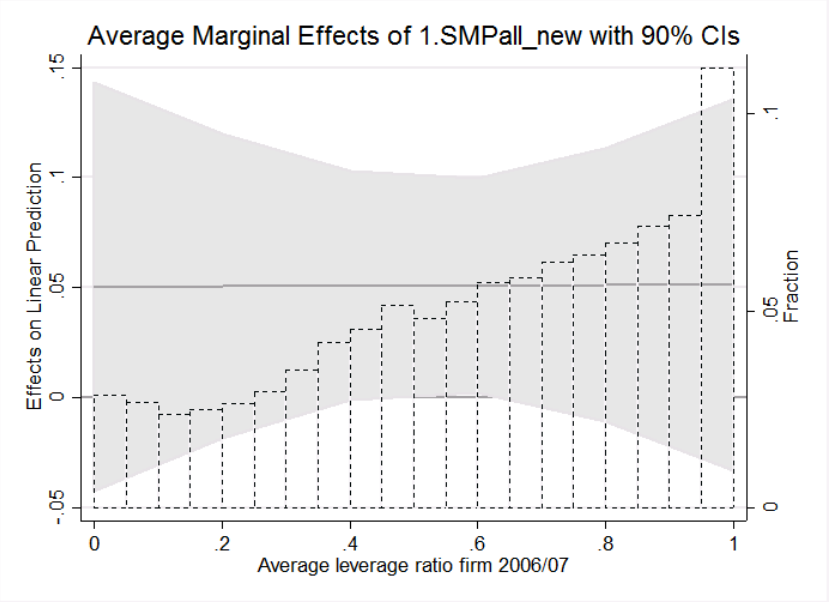


Figure 3: Marginal effects for firms connected to strong banks

This figure shows marginal effects of the treatment (SMP) conditional on the post period on the **log differences of loans** (in EUR) for firms connected to **strong banks**. Time series are collapsed on the firm level into one observation in the pre (2007-2009) and post (2010-2013) period, respectively. A bank is defined as weak if it was among the lowest decile of the distribution of the equity ratios of all banks in the sample in the year 2007, and strong otherwise. The sample covers 57,723 small and medium German firms according to the definition of SMEs by the European Commission, or 115,446 firm-year observations (two observations per firm). The underlying regression analysis is a quadruple differences-in-differences model, including firm fixed effects, industry-period and region-period fixed effects. Standard errors are clustered on the bank level. The grey area indicates confidence intervals at the 10% level. The histogram shows the distribution of leverage ratios during the years 2006/2007 for the underlying sample.

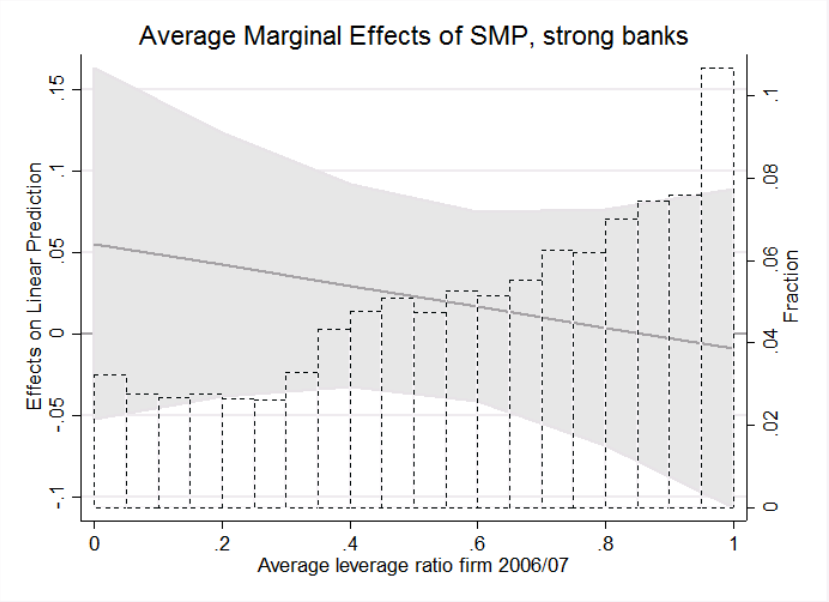
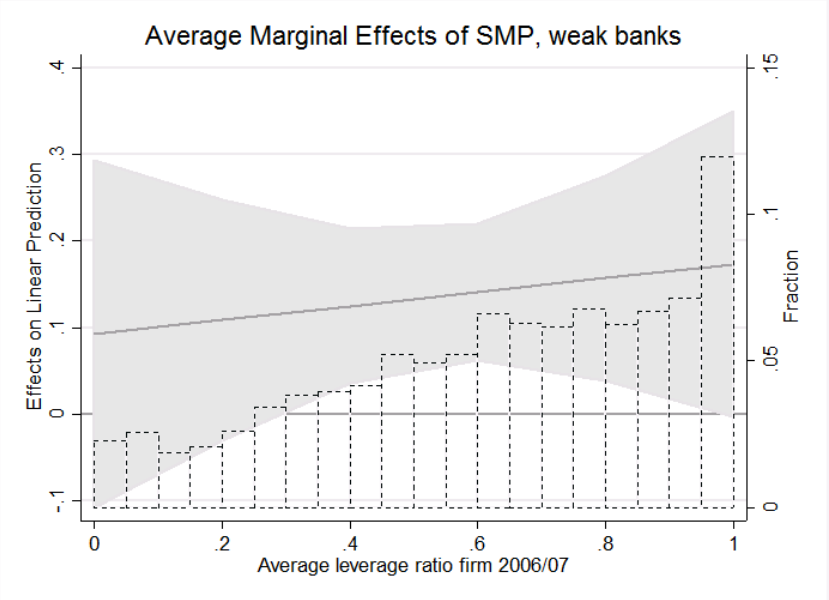


Figure 4: Marginal effects for firms connected to weak banks

This figure shows marginal effects of the treatment (SMP) conditional on the post period on the **log differences of loans** (in EUR) for firms connected to **weak banks**. Time series are collapsed on the firm level into one observation in the pre (2007-2009) and post (2010-2013) period, respectively. A bank is defined as weak if it was among the lowest decile of the distribution of the equity ratios of all banks in the sample in the year 2007, and strong otherwise. The sample covers 57,723 small and medium German firms according to the definition of SMEs by the European Commission, or 115,446 firm-year observations (two observations per firm). The underlying regression analysis is a quadruple differences-in-differences model, including firm fixed effects, industry-period and region-period fixed effects. Standard errors are clustered on the bank level. The grey area indicates confidence intervals at the 10% level. The histogram shows the distribution of leverage ratios during the years 2006/2007 for the underlying sample.



B.2 Effect on surrounding firms

Figure 5: Marginal effects on surrounding firms on investments for lowest and highest quartile

This figure shows marginal effects of firms which are non-treated on **investments**, measured according log differences in fixed assets less depreciation, conditional on the share of firms in the same region which are treated ($SMPshare$). Light grey shows the marginal effects for firms in the lower quartile in terms of leverage. Dark grey shows marginal effects for firms in the upper quartile in terms of leverage. The underlying regression analysis is a triple differences-in-differences model, including firm fixed effects and industry-time fixed effects. The pre period covers the years 2007-2009, the post period covers the years 2010-2013. Standard errors are clustered on the region. The grey area indicates confidence intervals at the 10% level. The histogram shows the distribution of the SMP share during the post period for the underlying sample. The sample composes of the same firm-year observations as in the baseline model which makes use of change of loans as dependent variable.

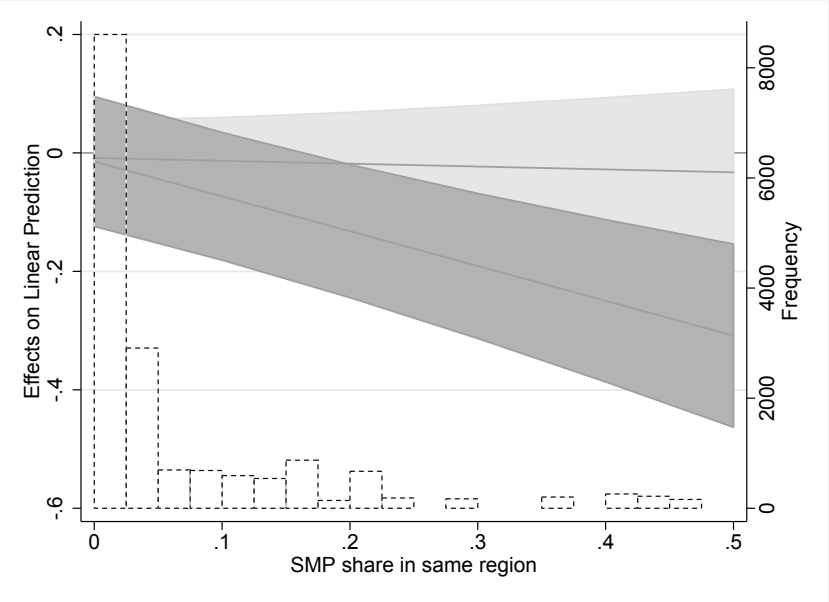


Figure 6: Marginal effects on surrounding firms on investments for lowest and highest decile

This figure shows marginal effects of firms which are non-treated on **investments**, measured according log differences in fixed assets less depreciation, conditional on the share of firms in the same region which are treated ($SMPshare$). Light grey shows the marginal effects for firms in the lower decile in terms of leverage. Dark grey shows marginal effects for firms in the upper decile in terms of leverage. The underlying regression analysis is a triple differences-in-differences model, including firm fixed effects and industry-time fixed effects. The pre period covers the years 2007-2009, the post period covers the years 2010-2013. Standard errors are clustered on the region. The grey area indicates confidence intervals at the 10% level. The histogram shows the distribution of the SMP share during the post period for the underlying sample. The sample composes of the same firm-year observations as in the baseline model which makes use of change of loans as dependent variable.

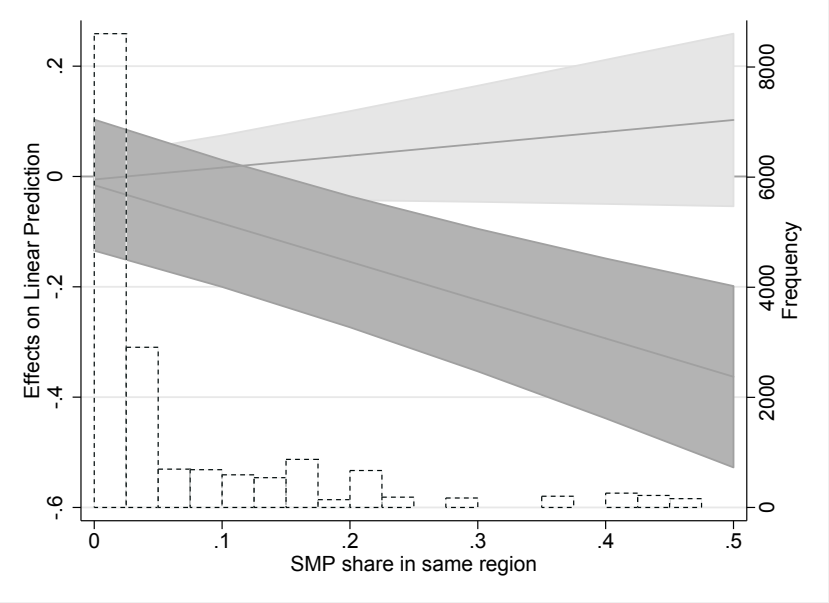


Figure 7: Marginal effects on surrounding firms on number of employees for lowest and highest quartile

This figure shows marginal effects of firms which are non-treated on **log number of employees**, conditional on the share of firms in the same region which are treated ($SMPshare$). Light grey shows the marginal effects for firms in the lower quartile in terms of leverage. Dark grey shows marginal effects for firms in the upper quartile in terms of leverage. The underlying regression analysis is a triple differences-in-differences model, including firm fixed effects and industry-time fixed effects. The pre period covers the years 2007-2009, the post period covers the years 2010-2013. Standard errors are clustered on the region. The grey area indicates confidence intervals at the 10% level. The histogram shows the distribution of the SMP share during the post period for the underlying sample. The sample composes of the same firm-year observations as in the baseline model which makes use of change of loans as dependent variable.

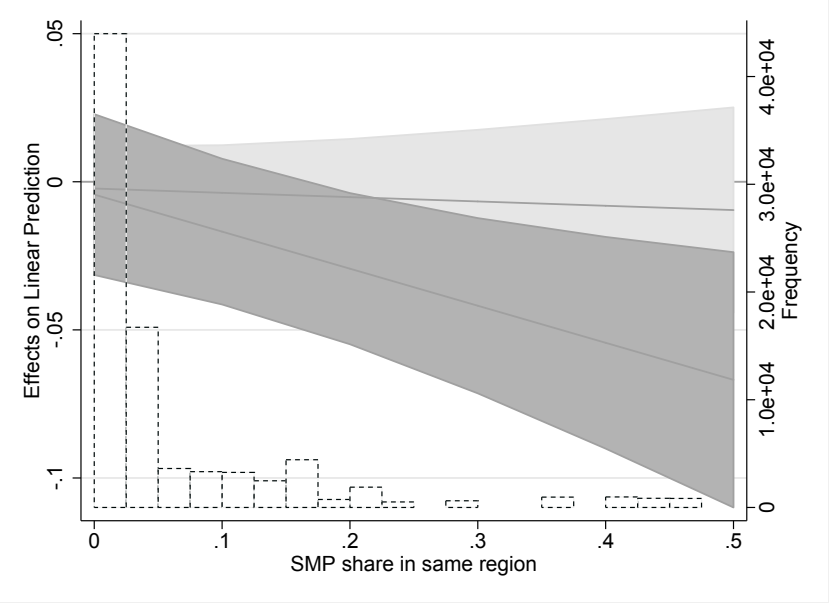


Figure 8: Marginal effects on surrounding firms on number of employees for lowest and highest decile

This figure shows marginal effects of firms which are non-treated on **log number of employees**, conditional on the share of firms in the same region which are treated ($SMPshare$). Light grey shows the marginal effects for firms in the lower quartile in terms of leverage. Dark grey shows marginal effects for firms in the upper quartile in terms of leverage. The underlying regression analysis is a triple differences-in-differences model, including firm fixed effects and industry-time fixed effects. The pre period covers the years 2007-2009, the post period covers the years 2010-2013. Standard errors are clustered on the region. The grey area indicates confidence intervals at the 10% level. The histogram shows the distribution of the SMP share during the post period for the underlying sample. The sample composes of the same firm-year observations as in the baseline model which makes use of change of loans as dependent variable.

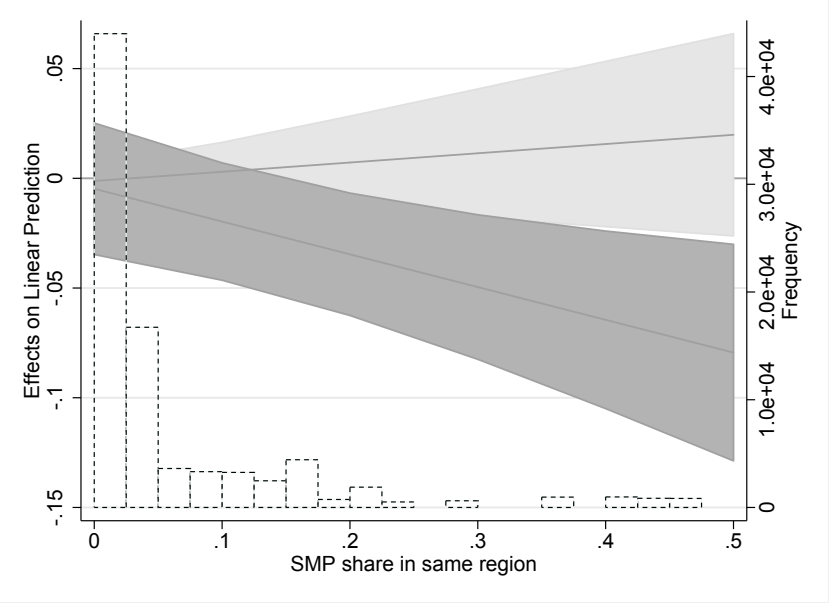
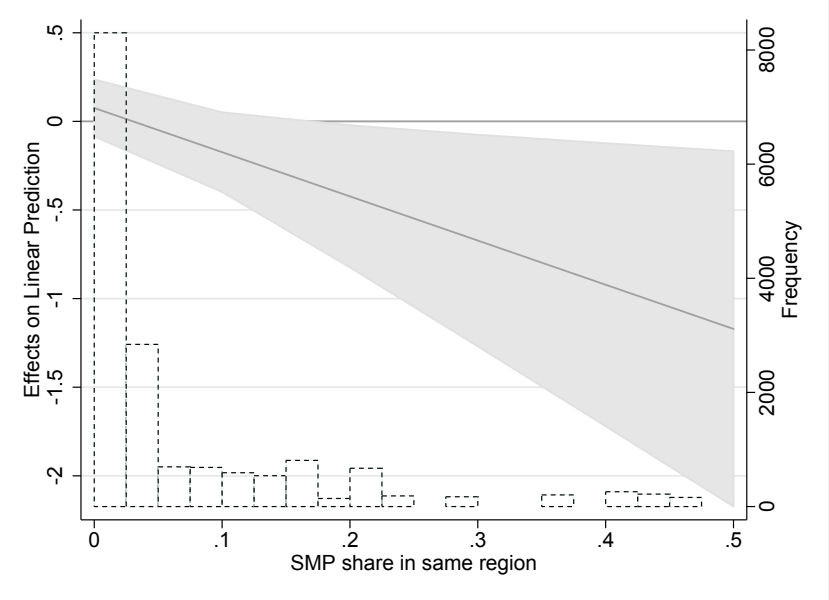


Figure 9: Marginal effect on investments for lowest decile conditional on low unemployment rate

This figure shows marginal effects of firms which are non-treated on **investments**, conditional on the share of firms in the same region which are treated ($SMPshare$) and only for regions with an average unemployment rate below 5% in the pre period for firms that are in the lower decile on terms of leverage. The underlying regression analysis is a quadruple differences-in-differences model, including firm fixed effects and industry-time fixed effects. The pre period covers the years 2007-2009, the post period covers the years 2010-2013. Standard errors are clustered on the region. The grey area indicates confidence intervals at the 10% level. The histogram shows the distribution of the SMP share during the post period for the underlying sample. The sample composes of the same firm-year observations as in the baseline model which makes use of change of loans as dependent variable.



C Firm level data cleaning

The Dafne dataset comprises more than 1.6 million firms during the period 2007-2013. After merging with Amadeus, the dataset covers 1,019,047 firms. To derive a consistent dataset, further data cleaning on the Amadeus firm financial dataset is necessary: If there are firm-year duplicates, I keep the unconsolidated balance sheet informations and drop consolidated data. Some firms have the same name but different IDs at Buerau van Dijk. This can be due to mergers. If name of firm, zip code and year is the same, but ID and consolidation code is different, the observations are dropped as I can assume that it is the same firm, but I do not know which report is the correct one. Further, observations with negative total assets are dropped. The age of the firm is calculated as the current year minus the year of incorporation and firms with negative age are dropped.

D Further results

Figure A.1: Marginal effects for firms connected to strong banks, not collapsed

This figure shows marginal effects of the treatment (SMP) conditional on the post period on the **log differences of loans** (in EUR) for firms connected to **strong banks**. A bank is defined as weak if it was among the lowest decile of the distribution of the equity ratios of all banks in the sample in the year 2007, and strong otherwise. The sample covers 281,206 firm-year observations. The underlying regression analysis is a quadruple differences-in-differences model, including firm age as a control variable, as well as firm fixed effects, industry-time and region-time fixed effects. The pre period covers the years 2007-2009, the post period covers the years 2010-2013. Standard errors are clustered on the bank level. The grey area indicates confidence intervals at the 10% level. The histogram shows the distribution of leverage ratios during the years 2006/2007 for the underlying sample.

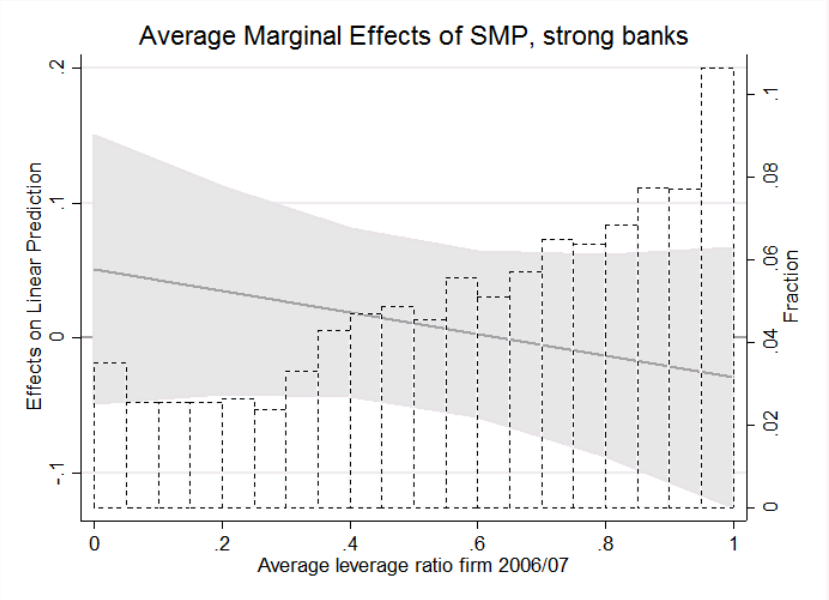


Figure A.2: Marginal effects for firms connected to weak banks, not collapsed
This figure shows marginal effects of the treatment (SMP) conditional on the post period on the **log differences of loans** (in EUR) for firms connected to **weak banks**. A bank is defined as weak if it was among the lowest decile of the distribution of the equity ratios of all banks in the sample in the year 2007, and strong otherwise. The sample covers 50,666 firm-year observations. The underlying regression analysis is a quadruple differences-in-differences model, including firm age as a control variable, as well as firm fixed effects, industry-time and region-time fixed effects. The pre period covers the years 2007-2009, the post period covers the years 2010-2013. Standard errors are clustered on the bank level. The grey area indicates confidence intervals at the 10% level. The histogram shows the distribution of leverage ratios during the years 2006/2007 for the underlying sample.