Journal of Banking and Finance 77 (2017) 64–77

Contents lists available at ScienceDirect

Journal of Banking and Finance

journal homepage: www.elsevier.com/locate/jbf

Cyclicality of SME lending and government involvement in banks☆,☆☆

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ARTICLE INFO

Article history:
Received 5 April 2016
Accepted 13 January 2017
Available online 17 January 2017

JEL classification:
G21
O16
R11

Keywords:
Banks
Loan growth
SME finance
Business cycles
Financial stability

ABSTRACT

Recent regulatory efforts aim at lowering the cyclicality of bank lending because of its potentially detrimental effects on financial stability and the real economy. We investigate the cyclicality of SME lending of local banks with versus without a public mandate, controlling for location, size, loan maturity, capitalization, funding structure, liquidity, profitability, and credit demand-side factors. The public mandate is set by local governments and stipulates a sustainable provision of financial services to local customers and a deviation from strict profit maximization. We find that banks with a public mandate are 25% less cyclical than other local banks. The result is credit supply-side driven and especially strong for public mandate banks with high liquidity and stable deposit funding. Our findings have implications for the bank structure, financial stability and the finance-growth nexus in a local context.

1. Introduction

The cyclicality of bank lending may create undesirable feedback effects that potentially reduce allocative efficiency in the economy. Too many firms may obtain credit in a boom and too few firms in a recession, which is both undesirable. Regulations like the risk-sensitive capital requirements introduced with the Basel II Accord may further increase cyclical bank lending behavior. In a recession, the higher ex ante default risk of bank borrowers triggers higher capital requirements for banks under risk-sensitive capital rules, which may lead to a decrease of credit supply and a tightening of lending standards. Fewer firms and households obtain credit. This mechanism lowers corporate investments and consumer spending, and thereby amplifies the recession. The opposite effect occurs during an economic boom, where excessive credit expansion may lead to an overheating of the economy. In recent years, policymakers and regulators have therefore undertaken significant efforts to reduce the cyclicality of bank lending. These comprise, for instance, macro-prudential policy tools, such as dynamic loan loss provisioning rules (Spain, Colombia and Peru), countercyclical capital buffers (Basel III Accord), loan-to-value caps (Japan), time-varying systemic liquidity surcharges, and stressed value-at-risk requirements (International Monetary Fund, 2011; Lim et al., 2011).

In this paper we investigate whether the cyclicality of lending depends on government involvement in banks. In our analysis, we focus on lending to small and medium-sized enterprises (SMEs) for the following reasons. SMEs represent the vast majority of all firms and they contribute significantly to overall employment and growth in many countries. However, SMEs are more opaque, riskier, more financially constrained and more bank-dependent than large firms (e.g., Petersen and Rajan, 1995). Therefore, bank lending to SMEs has always been prone to market failure because of problems arising from severe information asymmetries and its unattractive risk return profile. Financial institutions with special business objectives have emerged to overcome the market failure (e.g., local savings banks and credit cooperatives in Europe; credit unions in the U.S.; international and domestic development banks). In addition, government-led lending programs including direct subsidies and/or guarantees (e.g., the Small Business Adminis-

☆ This paper represents the authors' personal opinions and does not necessarily reflect the views of the Deutsche Bundesbank or its staff.

☆☆ The authors are grateful to an anonymous referee, André Güttler, Hendrik Hakenes, Christoph Herpfer, Felix Noth and Klaus Schaeck and participants at the Conference "Banking Development, Stability and Sustainability", SBIF/UDP in Santiago de Chile, the German Finance Association 2015 Conference in Leipzig, the Xth Annual Seminar on Risk, Financial Stability and Banking of the Banco Central do Brasil in São Paulo, the GdRE Nice Conference, IBEFA Day Ahead Conference 2015 at the FRB San Francisco, Brazilian Finance Association Conference 2015 and the 10th Mannheim Workshop in Banking for comments and suggestions. Parts of the paper were written while Lars Norden was visiting the Brazilian School of Public and Business Administration (FGV/EBAPE) in 2014. Financial support from the Erasmus Research Institute of Management (ERIM) is gratefully acknowledged (grant ERIM ref. E2599 Norden).

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http://dx.doi.org/10.1016/j.jbankfin.2017.01.010
0378-4266/

tration (SBA) in the U.S.), and special lending technologies, such as small business credit scoring and relationship lending, help overcome the inherent fragility of SME lending.

Banks' business objectives, including profit orientation and other goals, fundamentally influence their lending behavior, in particular their scale, scope and timing. The main hypothesis of this paper is that government involvement in banks in the form of a "public mandate" lowers the cyclicality of SME lending. The public mandate is included in the banks' by-laws by local governments and stipulates the sustainable provision of financial services to the local economy and the deviation from strict profit maximization. We conjecture that banks with a public mandate follow the business cycle to a lesser degree than other banks. If such banks effectively follow their public mandate, the lower cyclicality should be credit supply-side driven and not a consequence of differences in their borrower structures. Recent studies show that these banks help to reduce financial constraints of SMEs (Behr et al., 2013) and that the performance of these banks is positively related to local economic development (Hakenes et al., 2015).

To test our hypothesis, we use panel data from around 800 German banks spanning the period from 1987 to 2007. Germany provides a well-suited environment to test our hypothesis because of two institutional features. First, 96% of all firms in the German economy are SMEs according to the definition of the European Commission (2006), which enables us to focus on SME lending. Second, Germany has a banking system in which local banks with a public mandate and banks without a public mandate have been co-existing for more than 200 years (e.g., Allen and Gale, 2000; Krahnen and Schmidt, 2004). The local banks with a public mandate are known as savings banks, the other local banks are credit cooperatives. Both types of banks are small, local, focus on simple business models (deposit taking and lending), and have to comply with the same supervisory and regulatory standards. They are also both geographically constrained as their by-laws allow them to provide loans only to borrowers from the same county. Importantly, savings banks were founded by local governments in the 18th and 19th century (i.e., municipalities or county governments) and the public mandate is a binding legacy incorporated by the founders in the by-laws.[1]

We compare the cyclicality of SME lending by savings banks with that of credit cooperatives from the same location. We measure lending cyclicality by estimating the sensitivity of banks' growth in SME lending to GDP growth and various alternative proxies. Our empirical set-up keeps bank size and geographic focus constant and enables us to directly test whether banks' business objectives that follow from the public mandate affect the cyclicality of the lending behavior. To the best of our knowledge, ours is the first study that establishes a link between the cyclicality of SME lending and government involvement in local banks. Furthermore, our results are from a highly developed country rather than from a developing country where government involvement in banking is usually seen as negative as it is prone to corruption and inefficiencies.

We find that SME lending by savings banks is on average 25% less sensitive to GDP growth than that of cooperative banks from the same area. The effect is economically large and statistically highly significant. Such a strong difference in the cyclicality of SME lending is surprising because savings banks and cooperative banks are both local banks and focus on basic financial services. We control for bank location, size, capitalization, funding structure, profitability, and credit demand-side factors using interacted region-year fixed effects. The result remains robust when we use alternative measures of cyclicality, such as regional GDP growth, real growth in investments and the credit demand indicator from the European Central Bank's Bank Lending Survey. We also find that all size groups within the savings bank sector are less cyclical than credit cooperatives, and we do not find that smaller credit cooperatives are less cyclical than bigger ones. Interestingly, savings banks with the highest liquidity and the most stable deposit funding structure exhibit the lowest cyclicality in SME lending, suggesting that these banks are the ones that are best able to follow the public mandate. Moreover, the main result is credit supply-side driven. We document that the lower cyclicality of savings banks is significantly more pronounced in regions where bank competition is low. This is plausible because the observed lending should be closer to the intended credit supply in regions in which bank competition is relatively low as the bargaining power of banks vis-à-vis their borrowers is relatively high in such areas. We also show that political influence, which affects to some extent the lending behavior of savings banks, cannot explain the difference in the lending cyclicality between savings and cooperative banks. Finally, we rule out that the lower cyclicality of savings banks is associated with a different attitude towards risk-taking.

Overall, the evidence suggests that differences in business objectives of small local banks are the main driver of differences in their lending cyclicality. This conclusion has several important policy implications. First, policymakers can determine the cyclicality of local banking markets by deciding on the mix of banks that follow strict profit maximization and those that deviate from strict profit maximization to follow sustainability goals. This decision results in banking systems characterized by high risk-high return, low risk-low return, or intermediate solutions. Second, one possibility to promote local economic growth is to promote SME lending. This can be achieved with local banks that follow a public mandate or similar institutional arrangements, such as government-sponsored or guaranteed lending, as done by the Small Business Administration in the U.S. Our findings suggest that the public mandate reaches the goals envisaged by the banks' founders. Third, counter-cyclical regulations, such as capital buffers or dynamic loan loss provisions, are less necessary for banks that already exhibit a lower cyclicality because of their business objectives.

Our study contributes to research on the cyclicality of credit and research on government involvement in banks. First, recent research shows that public debt (corporate bonds) and private debt (bank loans) exhibit a different cyclicality. Becker and Ivashina (2014) examine the cyclicality of overall credit supply using data on new debt issuances of large, publicly listed U.S. firms. Firms switch from bank loans to bonds in times of tight lending standards, reduced aggregate lending, poor bank performance and monetary contraction. They show that this substitution effect from private debt to public debt has predictive power for funding provided by banks and corporate investments. Our paper focuses on an important component of the credit market that was excluded from their work, i.e., lending to SMEs.

Second, our work relates to research on government involvement in banks. On the one hand, there is evidence from cross-country studies that compare the lending behavior of privately owned banks with that of government-owned or government-controlled banks (e.g., La Porta et al., 2002; Brei and Schlcarek, 2013; Bertay et al., 2015). These banks mainly lend to large international firms, the public sector, and the government. The main finding in these studies is that the large, central government-owned banks exhibit underperformance and inefficient credit allocation because of agency problems, political influence, fraud and

[1] Furthermore, local politicians usually fulfill important supervisory functions in the savings banks and can therewith exert influence on their lending behavior. In the remainder of the paper, we will refer to savings banks as public mandate banks and banks with government involvement interchangeably.

corruption (e.g., La Porta et al., 2002; Sapienza, 2004; Dinç, 2005; Illueca et al., 2014; Carvalho, 2014). We note that virtually all studies in this field are based on data from relatively large, central or regional government-owned banks. On the other hand, there are studies that document positive aspects of government involvement in banking in the context of economic development (e.g., Stiglitz, 1993; Burgess and Pande, 2005; Brei and Schclarek, 2015; Ostergaard et al., 2016). Government involvement in commercial or consumer banking aims at ensuring credit supply to SMEs, promoting home ownership through mortgage lending, or fighting poverty. The reason for government involvement is market failure because capital markets and privately owned banks fail to offer certain financial services. Engel and Middendorf (2009) analyze firm survey data and find differences in the investment and financing behavior of firms that borrow either from savings banks or credit cooperatives. They also find that German SMEs are on average financially constrained. Behr et al. (2013) show that the lending behavior of savings banks in Germany reduces the financial constraints of SMEs. They also show that savings banks neither underperform nor do they take more risks than other banks. Hakenes et al. (2015) find that the performance of savings banks in Germany is positively related to local economic development. They document a beneficial effect of local banking on economic growth, while we document a beneficial effect on the cyclicality of SME lending. Our result is consistent with their findings, but our explanation is different. We show that the lower cyclicality of SME lending by savings banks is not due to a bank size effect, but due to the public mandate of savings banks. Shen et al. (2014) analyze banks from more than 100 countries during 1993–2007 and find that government-owned banks' performances are on par with that of private banks. Underperformance is only found if government-owned banks are required to purchase a distressed bank because of political factors. In addition, there is evidence that the outcomes of government involvement in banks depend on the legal and political institutions of the country (e.g., Körner and Schnabel, 2011; Bertay et al., 2015). We show that the cyclicality of local banks' SME lending differs and that this difference depends on their business objectives.

The remainder of this paper is organized as follows. In Section 2 we describe the institutional background. In Section 3 we describe the data and provide descriptive statistics. In Section 4 we explain our empirical strategy, report the main results, and summarize findings from robustness tests. In Section 5 we investigate potential channels through which the cyclicality of SME lending can be lowered. In Section 6 we perform further empirical checks and investigate alternative explanations. Section 7 concludes.

2. Institutional background

The German financial system provides a well-suited environment to test whether the cyclicality of SME lending by public mandate banks differs from that of banks without a public mandate. The German economy is dominated by SMEs that account for 96% of all firms (European Commission, 2006). These SMEs largely depend on bank financing, in particular provided by small local banks. The German banking system can be characterized as a typical universal banking system comprising three major pillars: the private credit banks, the credit cooperatives, and the banks with government involvement. Banks from these three pillars have different business objectives, governance, and organizational structures, but they all have to comply with the same supervisory and regulatory standards.

The sector of banks with government involvement consists of a large number of relatively small savings banks and a small number of large money center banks, known as "Landesbanks" (and excluded from our study).[2] According to official data from the Deutsche Bundesbank approximately 27% of total bank assets in Germany were held by banks with government involvement in 2013 and 13% by savings banks. Savings banks account for 19% of lending to non-banks. Savings banks were established and are controlled by the municipalities of the geographic area in which they operate (i.e., city or county council). They do not have any owners, profits are usually retained, and their capital largely consists of retained earnings. The key characteristic of these banks is their public mandate that is stated in their by-laws. It is compulsory for all savings banks and stipulates qualitative business objectives to ensure the non-discriminatory provision of financial services to households and SMEs in the same region, to strengthen competition in the banking business (even in rural areas), to promote savings and credit supply, and to sponsor a broad range of social commitments. These business objectives lead to a deviation from strict profit maximization and have become inherent determinants of the savings banks' business practice (see Deutscher Sparkassen- und Giroverband, 2014 for a more detailed description).

The by-laws require savings banks to operate only in the city or county they are headquartered in. The savings banks are mandatory members in the regional and federal savings bank associations. These associations provide the deposit insurance system and various management and marketing services. The performance, risk management and regulatory compliance is periodically monitored by the regional savings bank associations and the federal supervisors. It is noteworthy that banks with similar characteristics, governance and business objectives exist in many other countries, for example, Austria, France, Norway, Spain, and Switzerland.

The privately owned cooperative banking sector, which consists of a large number of small credit cooperatives, accounted for 9% of total bank assets and for 13% of total lending to non-banks by the end of 2013.[3] The size of this sector in the German banking system is, thus, comparable to that of the savings banks. Cooperative banks are regionally oriented, and in their commercial lending, similar to the savings banks, they focus almost entirely on local SMEs. Their by-laws stipulate the goal of creating economic value for the members of the cooperative that is paid out as dividends (Bundesverband der Deutschen Volksbanken und Raiffeisenbanken, 2014), which is similar to shareholder value creation by corporations. The private ownership results in a more pronounced orientation towards profit maximization than for savings banks.[4] Credit cooperatives are small and local but not subject to government involvement, which makes it possible for us to examine the effects of the latter on the cyclicality of savings banks' SME lending. Similar to savings banks, credit cooperatives are not idiosyncratic to the German banking system but can be found in many countries around the world. For instance, the sister of the German credit cooperative in the U.S. is the credit union. What is special to the German banking system is the long-run historic co-existence of savings banks and credit cooperatives, which creates an ideal setting to test our main hypothesis.

[2] Landesbanks serve as regional money center banks for savings banks in their region, as housebanks for regional governments, and are active in complex financial services and international banking. The recent history of the Landesbanks shows the conditions under which government involvement in the banking sector has led to underperformance and negative real effects (e.g., misallocation of credit, negative impact on real growth, political influence, as in La Porta et al., 2002). Because of their hybrid business model, we do not consider these banks in our study.

[3] There are also head institutions in the cooperative banking sector. Like the Landesbanks, these cooperative head institutions are not included in our analysis.

[4] It is not crucial for our analysis whether credit cooperatives are strict or weak profit maximizers. What matters is that cooperative banks are more oriented towards profit maximization than savings banks, which makes it possible to create economic value for their members.

Table 1
Summary statistics.
This table reports the 5%-percentile, the mean, the 95%-percentile and the standard deviation of key variables for savings banks and cooperative banks in Germany. All statistics are based on the average values per bank over time. *LG_SME* is de-trended and winsorized at the 0.5% and 99.5%-percentile. The sample period is 1987–2007. Significance levels *: 10%, **: 5%, ***: 1%.

Variable description	Variable	Savings banks				Cooperative banks				Difference	
		5%	Mean	95%	Std. Dev.	5%	Mean	95%	Std. Dev.	Mean	*t*-stat.
SME loan growth (%)	*LG_SME*	−1.29	1.30	4.74	1.84	−4.70	0.49	6.30	3.22	−0.80***	−4.43
Total assets (billion EUR)	*TOTASSET*	0.59	1.85	5.27	2.03	0.35	0.99	2.11	2.79	−0.86***	−5.05
Total customer loans (billion EUR)	*CUSTLOAN*	0.30	1.11	3.09	1.29	0.20	0.63	1.17	2.00	−0.48***	−4.10
Relative interest income (%)	*RII*	5.98	6.89	7.83	0.58	5.72	6.84	7.81	0.66	−0.05	−1.23
Relative net interest result (%)	*RNIR*	−0.98	0.74	1.77	0.86	-0.31	1.50	2.45	0.91	0.76***	12.01
Equity to assets ratio (%)	*ETA*	3.34	4.40	5.62	0.75	3.91	5.12	6.38	1.11	0.72***	10.89
Liquid assets ratio (%)	*LIQTA*	1.86	2.53	3.39	0.51	1.84	2.68	3.63	0.69	0.15***	3.54
Long-term loan ratio (%)	*LTLR*	61.70	69.29	77.21	4.80	44.79	59.34	84.14	10.77	−9.95***	−17.55
Interbank loan ratio (%)	*IBLR*	5.54	13.32	25.53	6.57	8.14	17.24	29.11	6.68	3.92	8.21
Deposit funding ratio (%)	*DEPR*	56.85	69.82	81.73	7.24	63.29	74.64	88.66	8.33	4.82	8.68
Number of bank-year observations			7629				5069				
Number of banks			461				330				

3. Data

We base our analysis on yearly balance sheet and income statement data of German savings banks and cooperative banks from the period 1987–2007 retrieved from the data provider Hoppenstedt.[5] The raw dataset is an unbalanced panel. To be able to analyze bank behavior over the business cycle, we consider only banks with a minimum of five consecutive bank-year observations. In case of a merger or an acquisition, the observation for the respective year in which the event occurs is excluded from the data. The final sample comprises 461 savings and 330 cooperative banks, resulting in 12,698 bank-year observations from 791 banks. This sample covers 85% of the assets held by German savings banks and 63% of the assets held by German cooperative banks by the end of 2013.[6] Table 1 reports summary statistics, calculated from average values over the time series for each bank. We report the mean and standard deviation separately for savings and cooperatives banks as well as the difference in means and a *t*-test for significance of these differences.

Our dependent variable is the growth in lending to SMEs, defined as the percentage change of bank *i*'s total loans to SMEs from the year *t*–1 to the year *t*: $LG\_SME_{i,t} = \frac{Total\ SME\ loans\ (t) - total\ SME\ loans\ (t-1)}{Total\ SME\ loans\ (t-1)}$. This variable is computed using bank and year-specific total lending as reported in individual banks' balance sheets and the sector-wide and year-specific fraction of loans to SMEs as reported in the statistics of the Deutsche Bundesbank. Lending to banks is excluded because this is a separate business activity with a fundamentally different risk-return structure. We de-trend the growth rates to adjust them for inflation and to make them comparable to our business cycle indicators which represent real numbers. We further winsorize SME loan growth at the 0.5% and 99.5%-percentile.[7] On average, *LG_SME* is significantly higher for savings banks (1.30%) than for cooperative banks (0.49%). We further see that savings banks are on average significantly larger than cooperative banks, as indicated by total assets (*TOTASSET*) and total customers loans (*CUSTLOAN*). The relative interest income ($RII_{i,t} = \frac{Interest\ income\ from\ loans\ (t)}{Average\ total\ loans\ (t-1,\ t)}$) is an indirect measure of the average loan interest rate and not significantly different between savings banks (6.89%) and cooperative banks (6.84%). The relative net interest result ($RNIR_{i,\ t}$) is similarly defined except that in the numerator interest expenses as the bank's refinancing costs and loan loss provisions in the respective year are subtracted. This bank profitability measure is significantly higher for cooperative (1.50%) than for savings banks (0.74%). Furthermore, the equity-to-total assets ratio ($ETA_{i,\ t}$) – a key measure of bank solvency – is on average 4.40% for savings banks and 5.12% for cooperative banks. The liquid assets ratio ($LIQTA_{i,\ t}$) is slightly smaller in savings banks (2.53%) than in cooperative banks (2.68%). Additionally, we control for the maturity structure of a bank's loan portfolio by defining the long-term loan ratio ($LTLR_{i,t} = \frac{Customer\ loans\ with\ maturity > 5\ years}{Total\ customer\ loans}$), which is significantly higher for savings banks (69.3%) than for cooperative banks (59.3%). The interbank loan ratio ($IBLR_{i,t} = \frac{Interbank\ loans}{Total\ lending}$) indicates that cooperative banks (17.2%) are on average more active in interbank lending than savings banks (13.3%). It can be seen that cooperative banks rely significantly more on deposit funding during the sample period. The statistically significant differences of these variables between savings and cooperative banks indicate that they should be included in the regression analyses because they might (at least partially) explain the variation in SME loan growth rates.

Finally, we use the real GDP growth rate in Germany as a standard indicator of the business cycle. Our results are very similar when we use alternative indicators of the business cycle. The GDP growth rate is computed using macroeconomic data from OECD statistics. Its development over the period 1987–2007 is displayed in Fig. 1.

As can be seen, our sample period covers two economic booms (1988–1990 and 1997–2000) and two recessions (1992–1993 and 2001–2003).

[5] Hoppenstedt gathers the data from the German Federal Gazette (Bundesanzeiger), see http://www.bilanzen.de. Two remarks are in order. First, our sample period ends before the start of the financial crisis of 2007–2009 because during the crisis extraordinary events in the financial system confounded the business cycle (resulting in a GDP growth of −5.6% in 2009 that was preceded and followed by positive GDP growth rates) and the normal relationship between loan growth and GDP growth. This fact would contaminate any study of the cyclicality of bank lending during this time period. Second, investment advisory firms, building societies, branches of foreign banks, and other specialized banks are excluded as well as atypical banks with a ratio of total customer loans to total assets below 25%.

[6] We note that the Hoppenstedt database does not cover several small cooperative banks, but the cooperative sector is nevertheless well covered in terms of total assets. That fact that several small cooperative banks are not included in the database makes the cooperatives banks that are included in the database more comparable to the savings banks.

[7] This transformation does not influence the results presented below.

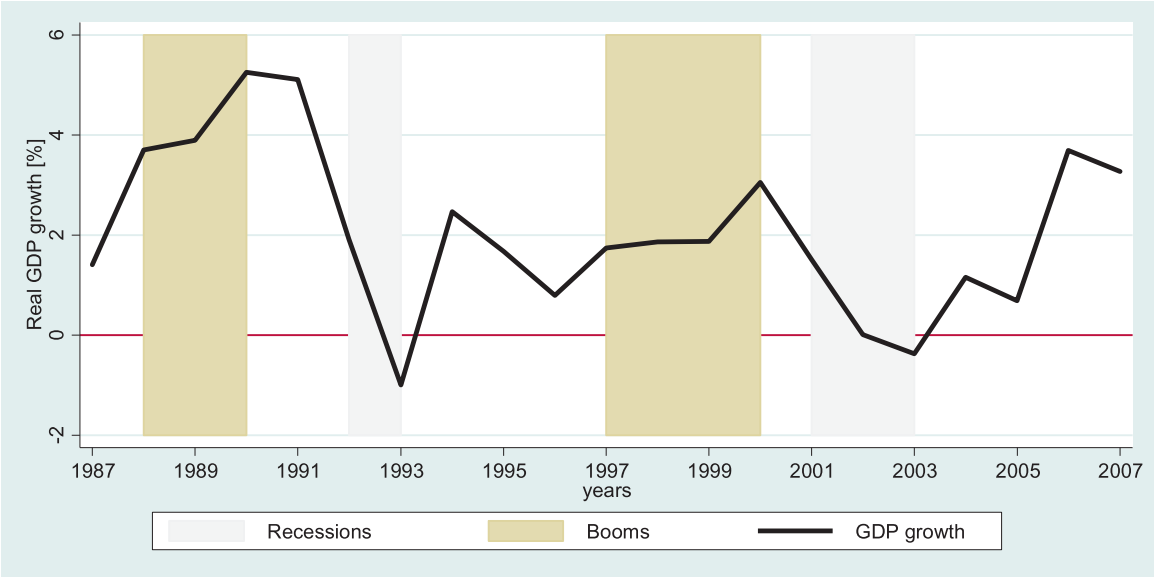

Fig. 1. Real GDP growth during 1987–2007.
The figure displays the time series of real GDP growth of Germany. The grey-shaded areas indicate the two major recession periods (1992–1993 and 2001–2003), the brown-shaded areas the two boom periods (1988–1990 and 1997–2000).

4. Empirical analysis

4.1. Model specification

We estimate the following regression model with data on bank i in year t:

$$LG\_SME_{i,t} = \alpha + \beta_1 \Delta GDP_t + \beta_2 (SAV_i * \Delta GDP_t) + \beta_3 SAV_i + \beta_4 LG\_SME_{i,t-1} + \beta_5 LG\_SME_{i,t-2} + \delta X_{t-1} + \gamma_{c,t} + \varepsilon_{i,t}.$$

The bank-year-specific growth rate of lending to SMEs ($LG\_SME_{i,t}$) is regressed on the year-specific German real GDP growth rate(ΔGDP_t). In order to capture differences in the cyclicality of savings banks' and cooperative banks' SME loan growth, we interact an indicator variable that equals one for a savings bank (and zero otherwise) with the real GDP growth rate ($SAV_i{}^*\Delta GDP_t$). As argued above, our hypothesis does not imply that savings banks do not display any cyclical behavior but only that savings banks are less cyclical than cooperative banks. Hence, we expect a positive coefficient β_1 and a negative coefficient β_2 for the interaction term.

We note that bank-specific SME loan growth rates exhibit second-order autocorrelation, for which we control by including the SME loan growth rates of the two preceding years ($LG\_SME_{i,t-1}$ and $LG\_SME_{i,t-2}$). The estimation of coefficients for lagged dependent variables with panel data suffers from the dynamic panel bias (Nickell, 1981). Therefore, we apply the one-step System GMM dynamic panel estimator of Blundell and Bond (1998) with Windmeijer's (2005) finite sample correction, where bank-specific fixed effects are purged by the forward orthogonal deviations transformation of GMM-type instruments.

We add a vector of bank-specific control variables (X_{t-1}) that correspond to the ones reported in Table 1. Due to the potentially significant correlation between these variables, some model specifications include only a subset thereof. Further, in some specifications we include year fixed effects (γ_t) or interacted year*region fixed effects ($\gamma_{c,t}$), where the regions are the federal states, in which the savings banks or cooperative banks are located.[8] Although the inclusion of year fixed effects captures year specific economic conditions, we can still estimate coefficients for the interaction terms ($SAV_i{}^*\Delta GDP_t$) . The interacted year and region fixed effects control for region and time-specific credit demand side shocks that might hit savings and cooperative banks differently and therefore explain their different SME loan growth independent of the growth of real GDP.

[8] The definition of regions is identical for savings banks and cooperative banks.

4.2. Baseline results

Table 2 presents the baseline results. In column 1 we report results for the specification without any control variables except the lagged SME loan growth rates.

The interaction term $SAV_i{}^*\Delta GDP_t$ is negative and statistically significant at the 1%-level. This finding shows that savings banks display a significantly lower cyclicality in SME lending than cooperative banks, which is in line with our hypothesis. The result also shows that, while savings banks seem to be less cyclical than cooperative banks, they still engage to some extent in cyclical lending behavior because the total effect of ΔGDP_t and $SAV_i{}^*\Delta GDP_t$ is positive ($0.487-0.316 = 0.171$). This is, again, in line with our expectation.

In column 2 we add variables to control for observable heterogeneity between savings banks and cooperative banks. The main result does not change. In column 3 we add year fixed effects to control for time trends that may affect credit supply. Again, the main result is confirmed. In column 4 we report the results of a model specification with a full set of year*region fixed effects and two additional control variables. The year*region fixed effects control for any region-specific demand-side shocks in any given year that might affect SME loan growth of savings banks and cooperative banks differently and therefore explain our findings. Adding these fixed effects makes it possible for us to interpret the differences in cyclicality as credit supply-side driven rather than credit demand-side driven (e.g., stemming from differences in the borrowers of the banks). Again, we find a significantly positive coefficient for ΔGDP_t and a significantly negative coefficient for $SAV_i{}^*\Delta GDP_t$, implying that the credit supply of savings banks is approximately 25% less sensitive to GDP growth than that of cooperative banks ($\beta_2 = -0.256$). In all subsequent analyses, we consider the specification in column 4 as our baseline model.

Table 2
Differences in the cyclicality of SME lending by small local banks.
The dependent variable is the real growth rate of loans to SMEs ($LG\_SME_{i;t}$). Models (1)–(4) are estimated using the one-step *System GMM* estimator introduced by Blundell and Bond (1998), where bank-specific fixed effects are purged by the forward orthogonal deviations transformation of *GMM*-type instruments. These instruments are created for our main regressors $LG_{i;t-2}$, ΔGDP_{t-1} and ($\Delta GDP_t * SAV_i$), and in order to bring the number of instruments in line with our finite sample size, the number of lags used is limited accordingly. Furthermore, we create a collapsed set of *GMM*-type instruments for the control variables $RII_{i;t-1}$, $RNIR_{i,t-1}$, $ETA_{i;t-1}$, $LIQTA_{i,t-1}$, $LTLR_{i,t-1}$, $IBLR_{i,t-1}$ and $DEPR_{i;t-1}$. Year, region and bank type dummies are included in the regressions as *IV*-type instruments. Region fixed effects are on the level of federal states. Model (5) is a least-squares estimate with bank-level fixed effects. Additionally, in the least-squares estimate of Model (6), observations are weighted by their frequency in a propensity score-matched sample (PSM). We report robust standard errors using Windmeijer's (2005) finite sample correction in parentheses below coefficients. Significance levels *: 10%, **: 5%, ***: 1%.

Model sample	(1) 1987–2007	(2) 1987–2007	(3) 1987–2007	(4) 1987–2007	(5) 1987–2007	(6) PSM
Estimator	Sys. GMM	Sys. GMM	Sys. GMM	Sys. GMM	Least squares, bank fixed effects	Weighted least squares
ΔGDP_t	0.487***	0.434***	0.320*	1.027***	0.689***	0.681***
	(0.056)	(0.056)	(0.172)	(0.119)	(0.110)	(0.108)
$SAV_i * \Delta GDP_t$	−0.316***	−0.317***	−0.351***	−0.256***	−0.410***	−0.246***
	(0.063)	(0.063)	(0.061)	(0.071)	(0.063)	(0.047)
$LG\_SME_{i,t-1}$	0.574***	0.576***	0.428***	0.371***	0.250***	0.299***
	(0.021)	(0.022)	(0.035)	(0.044)	(0.035)	(0.010)
$LG\_SME_{i,t-2}$	0.132***	0.148***	0.150***	0.168***	0.035***	0.018*
	(0.019)	(0.020)	(0.026)	(0.031)	(0.011)	(0.010)
SAV_i	0.619***	1.519***	0.712***	0.951***		
	(0.145)	(0.172)	(0.167)	(0.304)		
$RII_{i,t-1}$		0.074	0.257	0.500*	0.084	0.426***
		(0.056)	(0.254)	(0.277)	(0.174)	(0.143)
$RNIR_{i,t-1}$				0.371***	0.356***	0.076
				(0.139)	(0.090)	(0.054)
$ETA_{i,t-1}$		0.406***	−0.212**	−0.598***	−0.196*	−0.225***
		(0.098)	(0.087)	(0.146)	(0.104)	(0.083)
$LIQTA_{i,t-1}$		0.258***	0.081	0.187*	0.141**	0.130***
		(0.065)	(0.070)	(0.099)	(0.070)	(0.050)
$LTLR_{i,t-1}$				0.033***	0.014*	0.016***
				(0.011)	(0.007)	(0.006)
$IBLR_{i,t-1}$		0.074***	0.015	0.015	0.052***	0.062***
		(0.009)	(0.011)	(0.016)	(0.011)	(0.008)
$DEPR_{i,t-1}$		0.046***	−0.006	0.031	0.069***	0.026***
		(0.014)	(0.014)	(0.027)	(0.013)	(0.010)
Intercept	−0.710***	−8.663***	1.583	−7.839	−5.097**	−4.826***
	(0.132)	(1.030)	(2.091)	(3.689)	(2.164)	(1.430)
Year fixed effects	No	No	Yes	No	No	No
Year-region fixed effects	No	No	No	Yes	Yes	Yes
Number of observations	9743	9740	9740	8376	8376	9975
Number of banks	791	791	791	786	786	527
Test for AR(1): $Pr > z$	0.000	0.000	0.000	0.000	–	–
Test for AR(2): $Pr > z$	0.974	0.556	0.422	0.107	–	–
Hansen test: $Pr > \chi^2$	0.123	0.117	0.495	0.572	–	–
Number of instruments	728	728	749	782	–	–
Wald test for $\beta_1 + \beta_2 = 0$: $Pr > F$	0.000	0.000	0.432	0.275	0.013	0.000

The estimates presented in column 5 are based on the same explanatory variables as in column 4, but they are estimated using an OLS estimator with bank fixed effects instead of the System GMM dynamic panel estimator applied in columns 1–4. The coefficients and significance levels show that the previous results are confirmed.

In column 6 we re-estimate the specification from column 4 on a propensity score-matched sample (PSM) of savings and cooperative banks. The matching is based on the bank variables displayed in Table 1. We use Kernel matching to create the two samples. The PSM procedure should alleviate concerns that, despite controlling for observable differences in key bank variables, the comparability of the two bank types is limited because of unobserved differences in the two samples.[9] Again, we find a significant difference in the cyclicality of SME lending by savings banks and cooperative banks.[10] Both bank types display cyclical lending behavior, but savings banks are significantly less cyclical than cooperative banks. These results are consistent with the conjecture that the public mandate reduces the extent to which banks exhibit cyclical lending behavior.

4.3. Further empirical checks and robustness tests

One could argue that the indicator for the business cycle – GDP growth – does not fully reflect the state of the economy. Moreover, it is possible that the lower cyclicality of savings banks is stage-dependent and potentially asymmetric. It could be that the result is driven by a particular lending behavior in one stage of the business cycle, i.e., smaller increase of lending in a boom or smaller decrease of lending in a recession. We address these concerns in two steps.

First, we repeat our analysis with alternative indicators for the business cycle. As mentioned before, in all subsequent analyses we

[9] We acknowledge that the matching procedure is based on observable characteristics only and the two samples might still differ in terms of unobservable characteristics that we are not able to control for in the regressions.

[10] In additional analyses we compare savings banks and cooperative banks with privately owned commercial banks in Germany. Commercial banks exhibit significantly higher cyclicality than the two other types of banks. However, considering that the commercial banks are not comparable to savings banks and cooperative banks in terms of size and business model we do not report the results here. The results are available from the authors on request.

Table 3
Alternative indicators of the business cycle.
The dependent variable is the real growth rate of loans to SMEs ($LG\_SME_{i;t}$). All models have been estimated for the full sample (1987–2007) using the one-step *System GMM* estimator introduced by Blundell and Bond (1998) as in Model (4) of Table 2. *GMM*-style instruments are created for our main regressors $LG_{i;t-2}$, $MACRO_{t-1}$ and ($MACRO_t * SAV_i$). The first lag of the IFO business climate index (IFO_{t-1}), the real regional GDP growth rate ($\Delta RegGDP_t$), real investment growth ($\Delta INVEST_t$), and the loan demand by SMEs as measured by European Bank Lending Survey data (BLS_SME_t) serve as macro variables. We report robust standard errors using Windmeijer's (2005) finite sample correction in parentheses below coefficients. Significance levels *: 10%, **: 5%, ***: 1%.

Model	(1)	(2)	(3)	(4)
IFO_{t-1}	0.077			
	(0.057)			
$SAV_i * IFO_{t-1}$	−0.048***			
	(0.017)			
$\Delta RegGDP_t$		0.106		
		(0.073)		
$SAV_i * \Delta RegGDP_t$		−0.152***		
		(0.059)		
$\Delta INVEST_t$			0.283***	
			(0.038)	
$SAV_i * \Delta INVEST_t$			−0.133***	
			(0.030)	
BLS_SME_t				3.825***
				(1.060)
$SAV_i * BLS\_SME_t$				−2.337**
				(0.949)
$LG\_SME_{i,t-1}$	0.431***	0.430***	0.376***	0.300***
	(0.040)	(0.039)	(0.043)	(0.054)
$LG\_SME_{i,t-2}$	0.148***	0.141***	0.180***	0.165***
	(0.029)	(0.030)	(0.032)	(0.051)
SAV_i	5.067***	1.019***	0.761***	7.827***
	(1.728)	(0.284)	(0.269)	(2.869)
Bank controls and fixed effects	Yes	Yes	Yes	Yes
Number of observations	8735	7386	8376	2365
Number of banks	787	784	786	665
Test for AR(1): $Pr > z$	0.000	0.000	0.000	0.000
Test for AR(2): $Pr > z$	0.273	0.521	0.070	0.299
Hansen test: $Pr > \chi^2$	0.134	0.158	0.536	0.001
Number of instruments	767	728	764	289
Wald test for $\beta_1 + \beta_2 = 0$: $Pr > F$	0.587	0.509	0.000	0.026

use, whenever econometrically possible, the specification from column 4 in Table 2. Table 3 reports the results.

In column 1 of Table 3 we use the IFO business climate index as an alternative to GDP growth. This is a widely-used survey-based index that indicates the state of the German economy. The IFO index tends to be a leading indicator of actual GDP growth. We find that the coefficient of the interaction term $SAV_i * IFO_{t-1}$ is significantly negative, which is consistent with our baseline results. In column 2 we use the regional real GDP growth rate rather than the country-wide real GDP growth rate. Again, we obtain the same findings: the coefficient of the real regional GDP growth rate is positive and the coefficient of the interaction with the savings banks dummy is negative and significant. In column 3 we use the growth rate of real investments and confirm our main result. In column 4 we use the variable "Credit standards as applied to the approval of loans to small and medium enterprises" from the Bank Lending Survey of the European Central Bank.[11] In this specification we can directly rule out credit demand-side explanations for the differences in cyclicality across banks because the survey only gauges the credit supply side. Again, we find that SME lending by savings banks exhibits a significantly lower cyclicality than that of cooperative banks. While the economic magnitudes of the effects are not directly comparable to the baseline result, we find that the composite effect is still positive in all four specifications, indicating again that both bank types engage in cyclical lending behavior, but the savings banks do so to a lesser degree. These results confirm that our main finding remains robust when we use alternative indicators of the business cycle.

Second, we replace GDP growth with two dummy variables that take on the value of one in periods with HIGH or LOW GDP growth, respectively, and zero otherwise. We use Germany's mean real GDP growth rate during the sample period as the first split criterion to identify periods with relatively high or low growth, and a GDP growth rate of zero percent as the second split criterion to identify periods with absolute growth or decline. This analysis makes it possible to examine whether the reduced cyclicality in SME lending is symmetric through the cycle or asymmetric. Table 4 presents the results.

In column 1 of Table 4 we use the mean real GDP growth rate as a split criterion for HIGH and LOW periods. We find that the growth of SME lending by savings banks is significantly lower than that of cooperative banks during booms (coefficient of $SAV_i * \Delta GDP\_HIGH_t = -0.389$). We further find that the coefficient of $SAV_i * \Delta GDP\_LOW_t$ is positive but not statistically significant.

In column 2 of Table 4 we use GDP growth of zero percent as a split criterion and find a significant and symmetric effect through the business cycle: SME lending by savings banks grows at a lower rate than that of cooperative banks in periods with positive GDP growth, and it grows even during periods with negative GDP growth. The latter finding suggests that savings banks are not only less cyclical but counter-cyclical during negative GDP growth periods. Such behavior may be sustainable because it is symmetric

[11] The Bank Lending Survey from the ECB contains 17 specific questions on past and expected credit market developments. It is applied to senior loan officers of a representative sample of euro-area banks and is conducted on a quarterly basis. We use the survey results for Germany for our analysis. More details about the survey can be found here: https://www.ecb.europa.eu/stats/money/surveys/lend/html/index.en.html.

Table 4
High and low GDP growth.
The dependent variable is the real growth rate of loans to SMEs ($LG\_SME_{i,t}$). All models are estimated for the full sample (1987–2007) using the one-step *System GMM* estimator introduced by Blundell and Bond (1998) as explained above. *GMM*-style instruments are created for the dummy variables ΔGDP_HIGH_t, ΔGDP_LOW_t and their interactions with SAV_i. The real GDP growth rate, which is divided into periods of high growth (ΔGDP_HIGH_t) and periods of low growth (ΔGDP_LOW_t), serves as macro variable. Column (1) shows the results for a mean split and column (2) for a positive/negative split (i.e., at $\Delta GDP = 0\%$). We report robust standard errors using Windmeijer's (2005) finite sample correction in parentheses below coefficients. Significance levels *: 10%, **: 5%, ***: 1%.

Model	(1)	(2)
Split criterion for HIGH vs. LOW	Mean ΔGDP	$\Delta GDP = 0\%$
ΔGDP_HIGH_t	0.582***	0.638***
	(0.068)	(0.083)
SAV_i * ΔGDP_HIGH_t	−0.388***	−0.554***
	(0.073)	(0.092)
ΔGDP_LOW_t	−0.218	−0.008***
	(0.173)	(0.539)
SAV_i * ΔGDP_LOW_t	0.223	1.401**
	(0.191)	(0.602)
$LG\_SME_{i,\,t-1}$	0.391***	0.347***
	(0.027)	(0.028)
$LG\_SME_{i,\,t-2}$	0.091***	0.113***
	(0.023)	(0.024)
SAV_i	0.684**	1.567***
	(0.267)	(0.308)
$RII_{i,t-1}$	0.395***	0.500***
	(0.092)	(0.093)
$RNIR_{i,t-1}$	−0.071	−0.080
	(0.127)	(0.134)
$ETA_{i,t-1}$	−0.458***	−0.493***
	(0.152)	(0.162)
$LIQTA_{i,t-1}$	0.089	0.229***
	(0.081)	(0.086)
$LTLR_{i,t-1}$	0.041***	0.032***
	(0.007)	(0.007)
$IBLR_{i,t-1}$	0.023*	0.026*
	(0.013)	(0.014)
$DEPR_{i,t-1}$	0.031	0.042**
	(0.019)	(0.019)
Intercept	6.835***	−8.526***
	(1.471)	(1.539)
Bank controls and fixed effects	Yes	Yes
Number of observations	8376	8376
Number of banks	786	786
Test for AR(1): $Pr > z$	0.000	0.000
Test for AR(2): $Pr > z$	0.785	0.767
Hansen test: $Pr > \chi^2$	0.419	0.399
Number of instruments	782	782

through the business cycle, leading to an intertemporal smoothing of credit supply.

5. Channels

In this section, we examine possible channels through which savings banks achieve a lower lending cyclicality. Potential channels are bank size, loan maturity structure, funding structure and liquidity. First, one could argue that SME lending by smaller banks is less cyclical because the latter are more closely tied to the local economy, which might be less volatile over time than the country-wide economy. However, our main result (i.e., savings banks are on average significantly less cyclical than cooperative banks) in combination with the fact that the average savings bank is almost twice as big as the average cooperative bank speaks against this reasoning. We nevertheless carry out a formal test of a potential size effect. Note that in the previous analysis we normalized all bank variables by total assets so we cannot directly detect a size effect. Therefore, we create size terciles using average total assets of the savings banks ($AVGSIZE_i$). We interact these size terciles with the SAV_i * ΔGDP_t variable. The resulting triple interaction term informs us whether the lower cyclicality of savings banks is driven by savings banks in a particular size tercile. The comparison group in this regression is the average sized cooperative bank. We conduct the same analysis for banks' average long-term loan ratio ($AVGLTLR_i$) to examine whether maturity structure matters and whether banks' share of deposit funding ($AVGRELDEP_i$) are channels to achieve lower cyclicality. We also investigate whether bank liquidity ($AVGLIQTA_i$) is a potential channel. Table 5 presents the results.

In column 1 of Table 5, the coefficient of the interaction term SAV_i * ΔGDP_t is significantly negative, confirming our baseline result for the savings banks from Tercile 1. The coefficient of the triple interaction term with Tercile 2 is positive, but not statistically significant, but the one for Tercile 3 is significantly positive. This finding indicates that the average effect is also present at mid-sized savings banks, and to a smaller extent at larger savings banks.

In column 2 of Table 5 we study whether loan maturity might be a channel through which savings banks achieve lower cyclicality. We differentiate by savings banks' average long-term loan ratio ($AVGLTLR_i$) and find that the lower cyclicality of savings banks cannot be explained with the maturity structure of bank lending. The coefficients of the triple interaction terms (with Terciles 2 and 3) are not statistically significant, but their difference is (p-value of 0.004). This result indicates that the lower cyclicality is not due to a higher fraction of long-term lending by savings banks compared to cooperative banks. Instead, there are differences in the loan maturity structure within the savings banks sector.

In column 3 of Table 5 we investigate whether the bank funding structure, in particular banks' reliance on deposit funding – compared to wholesale funding – is a channel to achieve lower cyclicality in lending. We differentiate by savings banks' share of deposit funding relative to overall funding. Similar to the test for bank size effects (column 1) we find that the coefficient of the triple interaction term is positive and not statistically significant for Tercile 2, but it is significantly positive for Tercile 3 (banks with the highest share of deposit funding). The difference between both triple interaction terms is weakly statistically significant (p-value of 0.087). The cyclicality of the latter savings banks is similar to that of the average credit cooperatives. This finding is plausible because, on average, cooperative banks exhibit a higher deposit funding ratio than savings banks (see Table 1).

In column 4 of Table 5 we investigate whether bank liquidity affects the cyclicality of SME lending. Higher liquidity might make it possible for savings banks to better follow their public mandate. We measure bank liquidity with the liquidity ratio ($AVGLIQTA$), as in Puri et al. (2011, p. 569). We find a very strong and significant coefficient for savings banks in Tercile 3 (−0.449; highest liquidity ratio), while the baseline effect (−0.043) and the interaction term with Tercile 2 (−0.201) display the expected negative sign but are not statistically significant. This result provides an important additional insight: our baseline result becomes much stronger for savings banks that have sufficient liquidity to be able to lower the cyclicality of their credit supply to SMEs.

Table 5 indicates that our main result is most pronounced for savings banks with the highest deposit funding and savings banks with the highest liquidity, respectively. This finding suggests that the degree of deposit funding and the liquidity situation might be channels for the lower cyclicality of savings banks' SME lending. We therefore carry out one additional test. We check whether differences in the sensitivity of deposits and liquidity to GDP growth between savings banks and cooperative banks can serve as channels that enable savings banks to provide SME lending in a less cyclical way than cooperative banks. In these tests, we re-estimate

Table 5
Results by bank size, loan maturity, funding structure, and liquidity.
The dependent variable is the real growth rate of loans to SMEs ($LG\_SME_{i;t}$). All models are estimated using the one-step *System GMM* estimator introduced by Blundell and Bond (1998), where bank-specific fixed effects are purged by the forward orthogonal deviations transformation of *GMM*-type instruments. These instruments are created for our main regressors $LG_{i;t-2}$, ΔGDP_t and their interaction terms. We study the impact of four bank characteristics (size: $AVGSIZE_i$, long-term lending: $AVGLTLR_i$, deposit funding: $AVGRELDEP_i$, and liquid assets: $AVGLIQTA_i$). We create dummy variables for banks in the lower, mid and upper tercile (*Tercile1, Tercile2* and *Tercile3*), which we interact with ΔGDP_t and SAV_i. In order to bring the number of instruments in line with our finite sample size, the number of lags used is limited accordingly. Furthermore, we create a collapsed set of *GMM*-type instruments for the control variables $RII_{i;t-1}$, $ETA_{i;t-1}$, $LIQTA_{i,t-1}$, $LTLR_{i,t-1}$, $IBLR_{i,t-1}$ and $DEPR_{i;t-1}$. We report robust standard errors using Windmeijer's (2005) finite sample correction in parentheses below coefficients. Significance levels *: 10%, **: 5%, ***: 1%.

Model	(1)	(2)	(3)	(4)
Discriminant variable	$AVGSIZE_i$	$AVGLTLR_i$	$AVGRELDEP_i$	$AVGLIQTA_i$
ΔGDP_t	1.109***	0.983***	1.138***	0.856***
	(0.136)	(0.150)	(0.140)	(0.153)
Tercile2 * ΔGDP_t	−0.078	0.189***	−0.022	0.177
	(0.142)	(0.150)	(0.141)	(0.142)
Tercile3 * ΔGDP_t	−0.256*	−0.235*	−0.405***	0.345**
	(0.134)	(0.142)	(0.153)	(0.164)
SAV_i * ΔGDP_t	−0.396***	−0.235*	−0.473***	−0.043
	(0.117)	(0.131)	(0.122)	(0.113)
SAV_i * *Tercile2* * ΔGDP_t	0.152	−0.226	0.178	−0.201
	(0.167)	(0.172)	(0.165)	(0.167)
SAV_i * *Tercile3* * ΔGDP_t	0.312*	0.242	0.455***	−0.449**
	(0.160)	(0.171)	(0.172)	(0.188)
$LG\_SME_{i,\,t-1}$	0.431***	0.408***	0.424***	0.398***
	(0.042)	(0.044)	(0.044)	(0.043)
$LG\_SME_{i,\,t-2}$	0.163***	0.160***	0.151***	0.173***
	(0.034)	(0.035)	(0.033)	(0.033)
Tercile2	0.522	−0.337	−0.299	−0.553
	(0.336)	(0.385)	(0.350)	(0.360)
Tercile3	0.959**	1.093***	0.872**	−1.263***
	(0.383)	(0.393)	(0.405)	(0.418)
SAV_i	1.309***	0.941***	1.346***	0.542
	(0.336)	(0.357)	(0.343)	(0.373)
SAV_i * *Tercile2*	−0.471	0.649	−0.468***	0.377
	(0.389)	(0.426)	(0.404)	(0.407)
SAV_i * *Tercile3*	−0.751	−0.898*	−1.363***	0.888*
	(0.431)	(0.467)	(0.453)	(0.463)
Bank controls and fixed effects	Yes	Yes	Yes	Yes
Number of observations	8376	8511	8376	8376
Number of banks	786	787	786	786
Test for AR(1): $Pr > z$	0.000	0.000	0.000	0.000
Test for AR(2): $Pr > z$	0.287	0.257	0.365	0.332
Hansen test: $Pr > \chi^2$	0.182	0.379	0.196	0.150
Number of instruments	713	713	713	718
Wald test for $\beta_2 = \beta_3$: $Pr > F$	0.222	0.003	0.006	0.314
Wald test for $\beta_5 = \beta_6$: $Pr > F$	0.336	0.004	0.087	0.200

the baseline model from Table 2 with percentage changes in deposits and percentage changes in liquidity as dependent variables, respectively. The right-hand side of the models is the same as in Table 2. Table 6 presents the results.

We obtain two clear results. Column 2 of Table 6 shows that savings banks' deposits are less cyclical than those of cooperative banks. The coefficient of the interaction term SAV_i * ΔGDP_t is −1.483 and highly significant. Similarly, column 1 of Table 6 indicates that the liquidity of savings banks is less cyclical than that of cooperative banks. The coefficient of the interaction term SAV_i * ΔGDP_t is −0.195 and highly significant. Both results are consistent with the findings shown in columns 3 and 4 of Table 5 and suggest that deposit funding and the liquidity situation are channels through which savings banks lower the cyclicality of their SME lending. They are able to achieve a lower cyclicality in SME lending than cooperative banks because they take advantage of less cyclical deposit funding and liquidity, respectively. We acknowledge that there might be further channels at the micro level that we, unfortunately, cannot investigate with our data (for instance, time-varying lending standards or loan renegotiations).

6. Additional tests and alternative explanations

6.1. Credit supply and bank competition

We first provide a more direct examination of the question as to whether the lower cyclicality of savings banks is a credit supply-side effect or a credit demand-side effect. A credit demand-side effect could come from differences in the borrower structure of savings banks and cooperative banks. If savings banks lend to local borrowers that exhibit a less cyclical demand for credit than those of cooperative banks, then our findings might not be driven by the public mandate of savings banks but rather a selection effect in borrower clienteles. However, the main hypothesis of this study is that the credit supply of savings banks to SMEs is less cyclical because of their public mandate, which is operationalized through the goal to provide sustainable credit to the local economy and to deviate from strict profit maximization.

The previous results already indicate that the difference in lending cyclicality between savings and cooperative banks is a supply-side effect. First, when we include region*year fixed effects to control for time-varying regional demand for credit this does not affect our findings. Second, when we use the credit demand-related indicator for Germany from the European Central Bank's

Table 6
Channels for a lower lending cyclicality of savings banks.
The dependent variable in column (1) is the percentage change in banks' liquid assets ($\Delta LIQ_{i,t}$) and the dependent variable in column (2) is percentage change in banks' deposits ($\Delta DEP_{i,t}$) All models are estimated using a least-squares methodology with bank-level and interacted year*region fixed effects. We report robust standard errors in parentheses below coefficients. Significance levels *: 10%, **: 5%, ***: 1%.

Model	(1)	(2)
Dependent variable	$\Delta LIQ_{i,t}$	$\Delta DEP_{i,t}$
ΔGDP_t	4.457***	0.083
	(0.906)	(0.105)
SAV_i * ΔGDP_t	−1.483***	−0.195***
	(0.533)	(0.066)
$RII_{i,\,t-1}$	−5.697***	0.236
	(1.445)	(0.224)
$RNIR_{i,\,t-1}$	−0.154	0.402***
	(0.747)	(0.096)
$ETA_{i,\,t-1}$	−0.685	0.003
	(0.858)	(0.191)
$LIQTA_{i,\,t-1}$		−0.090
		(0.075)
$LTLR_{i,\,t-1}$	0.097	−0.015*
	(0.065)	(0.008)
$IBLR_{i,\,t-1}$	0.304***	−0.036***
	(0.088)	(0.012)
$DEPR_{i,\,t-1}$	0.025	
	(0.110)	
Bank-level fixed effects	Yes	Yes
Year*region fixed effects	Yes	Yes
Number of observations	9403	9403
Number of banks	788	788
R^2 (within)	0.156	0.217

Bank Lending Survey instead of GDP growth (column 4 of Table 3) we obtain the same result as in our baseline analysis. Third, savings banks and credit cooperatives in Germany have been competing in the same regions for the same borrowers for a very long period of time. Both bank types are subject to the mandatory regional principle (i.e., these banks are not allowed to lend to borrowers situated out of their home market). In addition, the "Borrowers statistics" on the German banking system (Deutsche Bundesbank, 2009) suggest that the industry composition of these banks' lending portfolios is very similar.

We provide an additional test that helps to rule out that differences in credit demand drive our findings. We take advantage of the cross-sectional and intertemporal variation in bank competition to identify whether the lower cyclicality of savings banks is credit supply-side or credit demand-side driven. We split our sample in observations with high and low bank competition. It is plausible that the observed credit volume is more closely related to the credit supply function rather than the credit demand function when the bargaining power of local banks vis-à-vis their borrowers is high. Bank bargaining power is high when local bank competition is low because borrowers have fewer alternatives to obtain credit (e.g., Petersen and Rajan, 1995). If the lower cyclicality of savings banks is a credit supply-side effect, then we should observe that this effect is stronger (i.e., savings banks are even less cyclical) when bank competition is low. To test this prediction, we augment our baseline model (column 4 of Table 2) by adding the triple interaction term SAV_i * log$HHI_{c,t}$ * ΔGDP_t (or: SAV_i * $COMP3_{c,t}$ * ΔGDP_t; SAV_i * $COMP5_{c,t}$ * ΔGDP_t), in which we use the Herfindahl–Hirschmann Index (HHI) or concentration ratios *COMP3* and *COMP5*, respectively, as measures of regional bank competition.[12] Recall that higher values of the HHI and the concentration ratios indicate lower bank competition. Based on the above reasoning we expect to find a significantly negative coefficient of this triple interaction term if the lower cyclicality of savings banks is a deliberately chosen supply side effect and not due to differences in credit demand. Table 7 reports the results.

In column 1 of Table 7 we find a negative and highly significant coefficient of the triple interaction term SAV_i * log$HHI_{c,t}$ * ΔGDP_t (−0.325). We obtain similar results for the triple interaction terms with the concentration ratios *COMP3* and *COMP5* in columns 2 and 3 of Table 7. These results indicate that savings banks are even less cyclical in their SME lending than cooperative banks when bank competition is low. This finding together with the evidence presented above suggests that our main result is related to the credit supply function of savings banks, which is ultimately defined by the public mandate in their by-laws, and not driven by differences in credit demand affecting savings and cooperative banks differently.

6.2. Political influence

We next investigate the role of political influence on the cyclicality of savings banks in more detail. One could argue that because of their important role as board members in controlling and supervising savings banks' activities, local politicians use savings banks to expand lending in election periods to increase the likelihood of becoming re-elected, and that this is the fundamental driver of the differences in lending cyclicality between savings banks and credit cooperatives. Political influence on lending behavior of public banks has been widely documented in the literature (e.g., La Porta et al., 2002; Sapienza, 2004; Dinç, 2005; Carvalho, 2014). As described earlier, most of these studies focus on large public banks that are owned or controlled by central governments, hence, their settings are not closely comparable to ours.

In our setting, it is unlikely that political influence plays a role in explaining our main result. If political influence affected the lending behavior of savings banks, we should expect to see an expansion of the lending volume in election years, for instance, to please voters. Such politically motivated expansion of bank lending should be asymmetric: it should take place in recessions but not in booms.

We can rule out this explanation for three reasons. First, political influence does not explain why savings banks increase their lending volume less than private cooperative banks in booms. Second, municipal elections take place every four to five years in Germany, but they are not scheduled simultaneously. There is no systematic correlation between the occurrence of election years and the state of the economy as reflected by the GDP growth. Hence, political influence cannot explain why savings banks are less cyclical on average. Third, the analysis reported in Table 4 shows that the lower cyclicality is due to a symmetric (and not an asymmetric) lending behavior of savings banks: they expand credit less in booms and they contract credit less in recessions.

We nevertheless provide a direct test as to whether and how the differences in the lending cyclicality of savings banks and cooperative banks can be explained with political influence on savings banks. We collect information about the years in which municipal elections take place during our sample period.[13] As an additional test, we also consider the years in which federal elections were conducted on a nation-wide level. We create a dummy variable $ELECTION_{c,t}$ that equals one if an election takes place in the county in which the respective bank is located in that year. We interact this dummy variable with the savings banks dummy and GDP growth (SAV_i * ΔGDP_t * $ELECTION_{c,t}$) and add all other neces-

[12] In this test, the regions correspond to the federal states in Germany.

[13] Elections on the level of the municipality take place at the same time in all municipalities in a given federal state in a given year in Germany. However, these elections do not take place at the same time across federal states.

Table 7
Cyclicality and bank competition.
The dependent variable is the real growth rate of loans to SMEs ($LG\_SME_{i,t}$). Model 1 corresponds to specification (4) of Table 2 and we apply the one-step *System GMM* estimator introduced by Blundell and Bond (1998) as explained above. The real GDP growth rate (ΔGDP_t) serves as macro variable. *GMM*-style instruments are created for our main regressors $LG_{i,t-2}$, ΔGDP_t, and their interactions with the savings banks dummy (SAV_i) and a measure for competition at the level of federal states in Germany. This is the natural logarithm of the Herfindahl–Hirschman Index ($\log HHI_{c,t}$) in Model 1, the concentration ratio based on the top 3 banks ($COMP3_{c,t}$) in Model 2 and the concentration ratio based on the top 5 banks ($COMP5_{c,t}$) in Model 3. We report robust standard errors using Windmeijer's (2005) finite sample correction in parentheses below coefficients. Significance levels *: 10%, **: 5%, ***: 1%.

Model	(1)	(2)	(3)
Competition measure	Herfindahl–Hirschman Index	Concentration ratio (top 3)	Concentration ratio (top 5)
ΔGDP_t	0.991**	0.702***	0.725***
	(0.408)	(0.213)	(0.278)
$SAV_i * \Delta GDP_t$	1.321***	0.208	0.246
	(0.486)	(0.166)	(0.191)
$\log HHI_{c,t} * \Delta GDP_t$	−0.014		
	(0.086)		
$COMP3_{c,t} * \Delta GDP_t$		1.247	
		(0.866)	
$COMP5_{c,t} * \Delta GDP_t$			0.832
			(0.951)
$SAV_i * \log HHI_{c,t} * \Delta GDP_t$	−0.325***		
	(0.103)		
$SAV_i * COMP3_{c,t} * \Delta GDP_t$		−1.706**	
		(0.699)	
$SAV_i * COMP5_{c,t} * \Delta GDP_t$			−1.432**
			(0.618)
$LG\_SME_{i,t-1}$	0.442***	0.447***	0.454***
	(0.044)	(0.043)	(0.044)
$LG\_SME_{i,t-2}$	0.170***	0.146***	0.137***
	(0.032)	(0.031)	(0.031)
SAV_i	−2.502**	0.359	−0.289
	(1.106)	(0.415)	(0.464)
$\log HHI_{c,t}$	0.173		
	(0.274)		
$COMP3_{c,t}$		−6.696***	
		(2.336)	
$COMP5_{c,t}$			−5.802**
			(2.320)
$SAV_i * \log HHI_{c,t}$	0.667***		
	(0.229)		
$SAV_i * COMP3_{c,t}$		2.525*	
		(1.466)	
$SAV_i * COMP5_{c,t}$			2.240*
			(1.315)
Intercept	−8.033**	−4.330	−4.297
	(3.589)	(3.658)	(3.624)
Bank controls and fixed effects	Yes	Yes	Yes
Number of observations	7079	7921	7921
Number of banks	621	782	782
Test for AR(1): $Pr > z$	0.000	0.000	0.000
Test for AR(2): $Pr > z$	0.164	0.953	0.788
Hansen test: $Pr > \chi^2$	0.437	0.241	0.343
Number of instruments	622	757	757

sary terms to the baseline regression model as additional controls. The results are reported in Table 8.

Most importantly, in our analysis of municipal elections, reported in column 1 of Table 8, we find a positive and significant coefficient for ΔGDP_t and a significantly negative coefficient for $SAV_i * \Delta GDP_t$, confirming our baseline result that savings banks are less cyclical than cooperative banks. We also obtain a significantly negative coefficient for $SAV_i * \Delta GDP_t * ELECTION_{c,t}$. Crucially, this triple interaction effect does not reduce the baseline effect of $SAV_i * \Delta GDP_t$ but it rather comes on top of it. In column 2 of Table 8, the triple interaction term is positive, but very small and not significant. In column 3 of Table 8 we exclude municipal election years from our sample and test whether our baseline results persist. We find that this is the case: the coefficient of $SAV_i * \Delta GDP_t$ is significantly negative and has the same order of magnitude as our baseline result in Table 2.

Overall, these tests suggest that despite some political influence on the lending behavior of savings banks, the cyclicality of savings banks' SME lending is still significantly lower than the one of privately owned cooperative banks and it is neither influenced by municipal nor by federal elections.

6.3. Risk taking

Finally, we investigate whether the lower cyclicality of savings banks is related to differences in risk-taking. Earlier research shows that excessive loan growth increases the riskiness of banks (e.g., Foos et al., 2010). The results reported in Table 4 suggest that the lower cyclicality of savings banks is symmetric, i.e., they exhibit a higher loan growth than cooperative banks in recessions and lower loan growth in booms. These results may imply that there is no risk-taking effect because the lending behavior is symmetric over

Table 8
Cyclicality and political influence.
The dependent variable is the real growth rate of loans to SMEs ($LG\_SME_{i,t}$). Model (1) corresponds to specification (2) of Table 2 and we apply the one-step *System GMM* estimator introduced by Blundell and Bond (1998) as explained above. This model is estimated for our full sample. The real GDP growth rate (ΔGDP_t) serves as macro variable. *GMM*-style instruments are created for our main regressors $LG_{i,t-2}$, ΔGDP_t, and their interactions with the savings banks dummy (SAV_i) and a binary variable $ELECTION_{c,t}$. This variable takes on a value of 1 if there was an election in the respective year and county in which the bank is located. While we consider municipal elections in Model (1), we analyze federal elections (general elections) in Model (2). Model (3) corresponds to specification (4) of Table 2, where we also include region-year fixed effects. This model is estimated for all observations where $ELECTION_{c,t}$. takes a value of zero. We report robust standard errors using Windmeijer's (2005) finite sample correction in parentheses below coefficients. Significance levels *: 10%, **: 5%, ***: 1%.

Model	(1) Full sample Municipal elections	(2) Full sample Federal elections	(3) $ELECTION_{c,t} = 0$ (Municipal elections)
ΔGDP_t	0.558***	0.795***	1.069***
	(0.068)	(0.082)	(0.132)
$SAV_i * \Delta GDP_t$	−0.356***	−0.359***	−0.258***
	(0.075)	(0.087)	(0.078)
$SAV_i * ELECTION_{c,t} * \Delta GDP_t$	−0.512***	0.073	
	(0.148)	(0.115)	
$LG\_SME_{i,t-1}$	0.554***	0.583***	0.376***
	(0.025)	(0.027)	(0.039)
$LG\_SME_{i,t-2}$	0.143***	0.119***	0.181***
	(0.021)	(0.023)	(0.032)
SAV_i	1.494***	1.745***	1.091***
	(0.214)	(0.231)	(0.307)
$ELECTION_{c,t}$	0.369	3.580***	
	(0.389)	(0.299)	
$ELECTION_{c,t} * \Delta GDP_t$	−0.512***	−0.937***	
	(0.148)	(0.116)	
$SAV_i * ELECTION_{c,t}$	0.096	−1.243***	
	(0.414)	(0.323)	
Intercept	−9.298***	−10.357***	−10.811***
	(1.208)	(1.072)	(3.487)
Bank controls	Yes	Yes	Yes
Region-year fixed effects	No	Yes	Yes
Number of observations	9740	9740	6739
Number of banks	791	791	786
Test for AR(1): $Pr > z$	0.000	0.000	0.000
Test for AR(2): $Pr > z$	0.969	0.081	0.368
Hansen test: $Pr > \chi^2$	0.549	0.132	0.401
Number of instruments	798	730	775

the stages of the business cycle. If we assume that ex ante borrower risk is higher in booms (because of the pooling of high and low risk borrowers) than in recessions (because of the separation of high and low risk borrowers), then the lower (higher) participation of savings banks in booms (recessions) ensures that their lending does not come with additional risks. However, it is possible that the higher loan growth of savings banks in recessions implies that these banks lend relatively more to riskier borrowers. It is therefore an empirical question as to whether this higher risk-taking in recessions outweighs the lower risk-taking because of lower loan growth in booms.

We provide a more direct examination of the potential link between cyclicality and risk-taking. We collect yearly bank-level information on write-offs and loan loss provisions and create the indicator variable $HIGHRISK_i$ that equals one if the write-offs and loan loss provisions relative to total assets exceed a certain threshold, and zero otherwise. The yearly information on the bank-level allows us to explore the cross-sectional as well as the time series dimension in the variation of write-offs and loan loss provisions. In Model 1 (Model 2) we set this threshold to the median (75%-quantile) of the yearly write-offs (loan loss provisions) relative to total assets. This classification allows banks to switch between the high risk and low risk category. In Model 3, we set the threshold to the 75%-quantile of the average write-offs and loan loss provisions relative to total assets.[14] Under this classification we assume that banks' risk-taking behavior is time-invariant. In Models 4 and 5, we use the standard deviation of return on assets (Std. Dev. (ROA)) and return on equity (Std. Dev. (ROE)), respectively, as an alternative risk measures. We include bank controls as before. We then study whether the lower cyclicality is mainly present at banks that lend to riskier borrowers by adding a full set of interaction terms of the variables SAV_i, $HIGHRISK_i$ and ΔGDP_t to our baseline regression model from Table 2. If the lower cyclicality comes with additional risk-taking we should find a significantly negative coefficient of the triple interaction term $SAV_i * HIGHRISK_i * \Delta GDP_t$. Table 9 reports the results.

The evidence speaks against the risk-taking hypothesis. The coefficient of $SAV_i * HIGHRISK_i * \Delta GDP_t$ is significantly positive in Models 1 and 2. This means that the loan growth of high risk savings banks exhibits a higher sensitivity to ΔGDP_t than the one of low risk savings banks. This finding implies that the former are more cyclical than the latter, which is the opposite of our prediction under the risk-taking hypothesis. In Models 3–5, the coefficient of $SAV_i * HIGHRISK_i * \Delta GDP_t$ is not statistically significant. There is no link between the cyclicality of savings banks' SME lending and their risk-taking behavior. We confirm our main result in all five models because we find a significantly negative coefficient of $SAV_i * \Delta GDP_t$. These findings suggest that we can rule

[14] We obtain similar results if we use higher quantiles instead of the 75%-quantile.

Table 9
Cyclicality and default risk.
The dependent variable is the real growth rate of loans to SMEs ($LG\_SME_{i,t}$). The regressions correspond to Model (2) of Table 2 where we apply the one-step *System GMM* estimator introduced by Blundell and Bond (1998) as explained above. We use the real GDP growth rate (ΔGDP_t) to measure cyclicality. *GMM*-style instruments are created for our main regressors $LG\_SME_{i,t-2}$, ΔGDP_t, and their interactions with the savings banks dummy (SAV_i) and a binary variable $HIGHRISK_i$. The threshold for *HIGHRISK* is the median of the yearly write-offs relative to total assets in Model (1), the 75%-quantile of yearly loan loss provisions in Model (2), the 75%-quantile of the average write-offs and loan loss provisions relative to total assets in Model (3). In Models (4) and (5), the thresholds correspond to the sample median of the variables, respectively. We include bank controls and fixed effects. We report robust standard errors using Windmeijer's (2005) finite sample correction in parentheses below coefficients. Significance levels *: 10%, **: 5%, ***: 1%.

Model	(1)	(2)	(3)	(4)	(5)
Proxy for *HIGHRISK*	Write-offs	LLPs	Write offs and LLPs	Std. Dev. (ROA)	Std. Dev. (ROE)
ΔGDP_t	1.046***	1.005***	1.005***	0.515***	0.553***
	(0.134)	(0.121)	(0.125)	(0.152)	(0.145)
$HIGHRISK_i * \Delta GDP_t$	−0.115	−0.070	−0.061	−0.077	−0.145
	(0.135)	(0.171)	(0.121)	(0.132)	(0.131)
$SAV_i * \Delta GDP_t$	−0.442***	−0.369***	−0.260***	−0.304***	−0.320***
	(0.100)	(0.087)	(0.085)	(0.113)	(0.108)
$SAV_i * HIGHRISK_i * \Delta GDP_t$	0.271*	0.370**	0.183	0.142	0.171
	(0.151)	(0.187)	(0.158)	(0.151)	(0.148)
$LG\_SME_{i,t-1}$	0.385***	0.419***	0.415***	0.383***	0.371***
	(0.040)	(0.036)	(0.045)	(0.045)	(0.048)
$LG\_SME_{i,t-2}$	0.143***	0.141***	0.144***	0.165***	0.162***
	(0.032)	(0.030)	(0.033)	(0.032)	(0.032)
$HIGHRISK_i$	−0.829**	−1.176***	−0.609*	−0.249	0.115
	(0.351)	(0.392)	(0.356)	(0.317)	(0.331)
SAV_i	1.021***	0.783***	0.825***	0.670**	0.819***
	(0.278)	(0.242)	(0.252)	(0.293)	(0.294)
$SAV_i * HIGHRISK_i$	−0.339	−0.340	0.159	0.034	−0.360
	(0.385)	(0.437)	(0.427)	(0.357)	(0.357)
Bank controls and fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	7950	7950	8376	8376	8376
Number of banks	786	786	786	786	786
Test for AR(1): $Pr > z$	0.000	0.000	0.000	0.000	0.000
Test for AR(2): $Pr > z$	0.325	0.419	0.426	0.346	0.353
Hansen test: $Pr > \chi^2$	0.255	0.414	0.535	0.498	0.635
Number of instruments	761	761	761	762	762

out that the lower cyclicality of savings banks' SME lending comes with additional risk-taking.

7. Conclusion

In recent years, policymakers and regulators have undertaken significant efforts to lower the cyclicality of bank lending because of its potentially detrimental effects on financial stability and the real economy. We examine whether the cyclicality of SME lending depends on government involvement in local banks, controlling for location, size, loan maturity structure, funding structure, liquidity, profitability, capitalization, and credit demand-side factors. Comparing local savings banks that follow a public mandate and local cooperative banks without such a mandate in Germany provides an ideal setting to test whether this type of government involvement affects the lending cyclicality because SMEs are credit-constrained and bank-dependent.

Our main result is that SME lending by banks that follow a public mandate is on average 25% less cyclical than that of other banks from the same location. Various robustness tests confirm this finding. We also provide several pieces of evidence that the effect we identify is a supply-side effect and cannot be explained by differences in credit demand vis-à-vis different types of banks. We finally rule out that the lower cyclicality comes with additional risk-taking.

The lower cyclicality of SME lending by small local banks that follow a public mandate can be explained as follows. First, they pursue goals related to the sustainable provision of financial services to the local economy and deviate from strict profit maximization. Second, savings banks with high liquidity and a more stable deposit funding structure exhibit the lowest cyclicality of SME lending. Third, the lower cyclicality can be achieved through time-varying differences in bank lending standards. Banks with government involvement approve relatively more loan applications in recessions, but they reject relatively more applications in booms. We cannot test the latter with our bank level data but we view this as an important avenue for future research.

While our results show one positive aspect of government involvement in banking, they do not allow us to make general statements about the benefits of having banks with government involvement in the financial system. To come to such a conclusion, one would have to perform an in-depth welfare analysis that takes all relevant dimensions into account. Such an analysis is beyond the scope of our paper.

Nevertheless, our study highlights an important link between the structure of local banking markets and SME lending. Policymakers can affect the cyclicality of bank lending by influencing the composition of the banking system (i.e., banks with public mandate versus banks without public mandate). Furthermore, economic policy that aims at promoting local economic growth has to ensure sufficient credit supply to local SMEs. This objective can be achieved through local savings banks or similar institutional arrangements, such as government-sponsored or guaranteed lending to SMEs, if privately owned banks do not offer this service. Finally, regulations that aim at lowering the cyclicality of bank lending, such as capital buffers or dynamic loan loss provisions, are less necessary (and potentially counterproductive) in financial systems that already exhibit a lower cyclicality because of their institutional structure.

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