

Savings Banks and the Industrial Revolution in Prussia Supporting Regional Development with Public Financial Institutions

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Abstract

We provide evidence that smaller, regional public financial intermediaries contributed to industrial development, using a new data set of the foundation year and location of Prussian savings banks. This extends the banking-growth nexus beyond its traditional focus on commercial banks to public banks. Since saving banks were public financial intermediaries, our results suggest that state intervention can be successful in the financial sector, particularly at early stages of industrial development when capital requirements are manageable, and access to international capital markets is limited.

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1) Introduction

What can the state do to promote the growth of remote, underdeveloped regions? Today, many developing countries are characterized by a high degree of regional inequality, with economic activity and wealth concentrated in a few, highly urbanized, agglomerations. Usually, high levels of spatial inequality in economic development within countries is inefficient and sub-optimal from a welfare perspective (Venables 2005).² Thus, even the countries of the European Union (EU) make significant efforts to reduce regional disparities in order to increase regional cohesion (e.g. Becker et al. 2010). There is a lot of research on the causes of disparities in regional development and industry concentration both on a global scale, and for particular countries (Chasco et al. 2012, Henderson et al. 2017, Roos 2005 or Wahl 2016).

However, less is known about policy interventions that promote regional convergence. The literature mostly focuses on the evaluation of money-transfer programmes like the EU cohesion fund (Becker et al. 2010), place-based policy targeting of disadvantaged regions (e.g. the “Zonenrandgebiet” in Germany (Seidel und von Ehrlich 2017) or on the effect of access to public infrastructure (Hornung 2015, Jedwab et al 2017 or Pfeifer et al. 2017). Thus, the literature has largely overlooked the potentially important role of the public financial sector in regional development and convergence.

The present study closes this gap by providing evidence that the introduction and spread of public savings banks in 19th century Prussia that was pushed by the authorities in the 1850s contributed to the growth of cities and fostered regional industrialisation processes, especially in small, remote cities. First, based on more than 800 Prussian cities, we study the contributions of savings banks to urban growth. Second, we shed light on the mechanisms by which these contributions were achieved. Thus, we consider for instance the impact on the rail infrastructure. Railways have significant and long-lasting positive effects on the development of a city or region, but their construction must be financed. Historically, railways were often privately operated and financed, but private financial institutions might not be willing or able to finance railways in remote areas. Likewise, local authorities often lack the funds to finance infrastructure in remote, sparsely populated areas---although a region would greatly benefit from access and the investment would be profitable in the long-run. Hakenes and Schnabel (2010) have studied the impact of public financial institutions from a theoretical perspective.

² High levels of spatial inequality are associated with inefficiently large urban agglomerations (congestion) but also with--among others--internal conflicts (Lessmann 2016) and lower institutional quality (Ezcurra and Rodriguez-Pose 2014).

They argue that because public banks are not profit-driven, they focus their activities towards long-term projects with high social returns. Hakenes et al. (2015) theoretically establish and empirically confirm (using data on contemporary savings banks in Germany) the idea that small regional banks live savings banks or cooperative banks are more efficiently enhancing local economic development than large banks do. This is because small local banks have more knowledge about their local customers and creditors and therefore lower screening and monitoring costs than larger banks. They also find that this is especially important for the economic growth of poor, peripheral regions with low initial capital endowments and credit rationing.

Our identification strategy uses a difference-in-difference- like approach, which is similar to that used elsewhere in the literature in comparable settings (see for instance Bodenhorn and Cuberes 2018, Lehmann-Hasemeyer and Streb 2016). We further make use of a decree issued in 1854 by the Minister for Trade and Commerce that introduces a plausible magnitude of exogeneity in the location of banks. The decree enhanced the equal distribution of savings banks, because it demanded the foundation of at least one savings bank per county. It further encouraged poorer local authorities to found a savings bank by offering institutional and financial support (see v. Knebel-Doveritz 1907, 6pp). Following this decree, we observe a wave of savings bank foundations on a much wider geographical distribution than before: While in 1849, we observe savings banks in about half of the counties, this had risen to nearly 95 percent by 1864. Furthermore, while in earlier periods we observe a significant pre-growth trend before the foundation of a savings bank in a city, there is no such trend after 1854. The savings banks that were founded during this wave were often founded in smaller cities that might not have been able to afford the foundations without this support. Thus, the decree can be seen as a public policy to promote the establishment of public financial infrastructure in remote regions. By looking at more than 900 Prussian cities,³ we find a strong positive relationship between the existence of these small public financial intermediaries and regional development around the early period of industrial development (1837 to 1875). Thus, the degree seems indeed to have been a successful step.

Our results go well with the recent research on the role of private local banks and financial systems on growth and development both during the industrial revolution and today. Guiso et al. (2004), for instance have shown that differences in local financial development are important

³ In 1900, about 60 percent of the total German population lived in Prussia.

determinants of economic success in modern Italy. Coccorese and Shaffer (2018) show that cooperative banks play an important role for the economic performance of Italian regions in the period from 2001-2011. Among the papers studying the impact of local banks on economic development in historical periods, Bodenhorn and Cuberes (2018) provide conclusive evidence that local commercial banks contributed significantly to city growth in early-nineteenth Century New York. Furthermore, Heblich and Trew (2015) present similar evidence for England in the same period. We add to this literature by being the first to study the impact public local banks and the effect of their particular business model on industrialisation.

Our paper also contributes to the old yet still unsettled debate about whether the financial sector promotes or just accompanies growth. This question has been studied intensively from a theoretical and an empirical perspective. Starting with the seminal paper of King and Levine (1993), a number of authors have argued in favour of a causal relationship. Levine and Zervos (1998), for instance, show that stock market liquidity and banking development both positively predict growth, capital accumulation and productivity improvements. Rajan and Zingales (1998) further show that industrial sectors that were relatively more in need of external finance developed disproportionately faster in countries with more developed financial markets.⁴ In this context, Germany and its bank-based financial system is one of the most intensively studied cases.⁵ Most famous is the work by Gerschenkron (1962), who claimed that moderately backward economies – like Germany in the 19th century – can speed up their growth by establishing modern financial institutions such as large universal joint stock banks.⁶ Apart from some rare papers by Guinnane (1997, 1998, 2002), Burhop (2006) and Proettel (2013), scholarly discussions about the banking-growth nexus in Germany have not given significant attention to

⁴ Fuldford (2015) finds that national banks played a pivotal role for productivity of manufacturing and agriculture in the United States in the late 19th century, especially in rural areas. However, other authors have argued that the fact that universal banks focussed on traditional sectors even harmed industrialisation (see Neuburger and Strokes 1974, Neuburger 1977).

⁵ While Lehmann-Hasemeyer and Streb (2016) recently challenged the view that Germany was a typical bank based system by showing that it had a well-functioning stock market for new technology by the end of the 19th century, it is commonly agreed that joint stock banks played a crucial role in Germany's industrialisation. See also Lehmann (2014) for the importance of large universal banks at the Berlin stock exchange and Lehmann-Hasemeyer and Burhop (2014), Burhop and Lehmann-Hasemeyer (2016) for the general development of all stock exchanges. A recent paper by Heblich and Trew (2015) also shows evidence for the bank-growth nexus in British industrialisation. Furthermore, Pascali (2016) shows that regional differences in banking development are highly persistent across Italian regions since the Renaissance, and that there is also a long-run positive effect of local banks on urban economic development.

⁶ This idea has been formalised for instance by Da Rin and Hellmann (2002). In their model, banks can propel an economy from a self-perpetuating low equilibrium to a sustainable high equilibrium. Banks can thus become the driving force in the big push towards industrialisation. On the other hand, endogenous models claim that the development of the banking sectors is a result of economic success and less its cause (see for instance Greenwood and Jovanovic (1990) and Pagano (1993)).

bank types other than universal banks. Guinnane (2002) outlines that although joint stock banks offered a wider range of services than did U.S. or British banks, and that it is therefore easy to believe that these banks were particularly able to foster growth and support firms at an early stage, there are important gaps in this literature. In this context, he mentions the savings banks in particular as neglected financial institutions that deserve more attention. In an empirical investigation based on aggregate time series for the whole of Germany, Burhop (2006) finds a positive relationship between the savings banks' financial depth and Germany's real capital stock for the period 1883 to 1913, but not for the earlier period.⁷

German industrialisation was not only based on large, multinational firms and coal resources: good public infrastructure, a competitive schooling system and small and medium-sized firms were the foundation of German industry. Savings banks as communal financial institutions provided significant funds for public infrastructure projects like railways and buildings, and were also crucial in financing small and medium-sized local industries. We provide conclusive evidence that small regional financial intermediaries were equally as important for the transition to modern economic growth as large universal banks and stock markets. Furthermore, since saving banks were public financial intermediaries, our results strongly suggest that state intervention can be very successful in the financial sector. This is particularly true in areas and regions at the beginning of an industrial take-off, when capital requirements are manageable and access to international capital markets is limited.

2) A brief history of savings banks

The first German savings banks were founded in the northern parts of the country, in Hamburg (1778), Oldenburg (1786), Kiel (1796), and Altona (1801) (Wysocki, 1980, 24). The foundation date for every single savings bank in Prussia up to 1875 can be found in the Prussian statistical yearbook "*Zeitschrift des Königlich Preußischen Statistischen Bureaus 1876*" (Königlich Preußisches Statistics Bureau 1876).⁸ The first Prussian savings bank was established in Berlin in 1818 (Ashauer, 1998), and by 1913, there were 1765 savings banks in Prussia and 3,133 in the whole German Empire (Deutsche Bundesbank, 1976, p. 63).

Savings banks held 24.8 per cent of the total assets of all German financial institutions in 1913, – the largest group of banks, followed closely by incorporated credit banks, comprising 24.2

⁷ Burhop (2006) also confirms empirically that joint stock credit banks positively influenced capital formation for the country's modern sectors.

⁸ Please note that there might be a slight selection bias, because we only observe savings banks that still existed in 1875. However, given the large number of new banks founded in this period, this bias seems negligible.

per cent, and mortgage banks at 22.8 per cent. Wysocki (1980, p.119) estimates that in the period 1851 to 1910, the savings banks rank at the top of all bank types in terms of net investments. Nevertheless, one might argue that the overall capital of each individual savings bank was too low to have an impact on a region. However, if we limit our scrutiny to the savings banks established after 1854 it becomes clear that this was not the case. In 1875 the average savings bank had assets of about 40 000 Marks, an average of 184 Marks per head (median 68 Marks per head) across all cities, and approximately 440 Marks per head for the smallest decile of cities (see Königlich Preußisches Statistisches Bureau 1876).

Savings banks were closely aligned with the local government. The 1808 Prussian directions for municipal self-administration (*Preussischen Städteverordnung*) gave municipalities autonomy in financial administration, including whether to found a savings bank. According to Schulz (2005, 22) savings banks generally existed as dependent departments of the local government up to the 1930s. The strong relationship between savings banks and communities was also manifested in their guarantor liabilities. The regional authority, which could be either the community, the town or the county, was liable for the obligations of the savings banks. Furthermore, the local authority had to ensure the economic stability of the savings banks (Schulz 2005, 22-23). The principal legislation covering the organisation, business practices and public control of Prussian savings banks was passed in 1838. The law required local authorities to prove that they could guarantee the deposits before permission would be granted to open a savings bank (§3, Prussian Regulation of 1838 (v. Knebel-Doveritz 1907, pp. 6).⁹ Savings banks and local authorities were often also connected via personal relationships. For example, the executive board of the savings bank in Altenburg in 1886 was made up of members of the local government, and bank employees were recruited and paid by the city council (Schulz 2005, Hiller 1996, 33).

Savings banks had a strong regional character, the so-called “*Regionalprinzip*” (Mura 1998, p. 27; Ashauer 1991, p. 177). Although this was not codified in every region, in most cases it was not possible to open an account if one did not live in that region. More importantly, investments were also supposed to be regional. This was to ensure that only those who would be liable if the bank failed benefitted from successful investments (Schulz 2005, p. 24). However, sometimes the benefits spilled into neighbouring regions, as we will outline below.

Local authorities had several clear reasons for founding savings banks (see Schulz 2005, 27-28): the main purpose was to give poorer people the opportunity to save and thereby gain

⁹ However, similar regulations can also be found in the statutes of the earlier savings banks (Schulz 2005, 23).

autonomy and independence.¹⁰ This social target is common to most of the early savings banks (Wysocki 2005, p. 18; Trende 1957).¹¹ Savings banks therefore created opportunities to take personal precautionary measures by accumulating private savings (see also Lehmann-Hasemeyer and Streb 2017), and this reduced the burden on local funds for poor relief. Furthermore, because of the local authorities' close relationship to "their" savings banks they had easy access to capital. Figure 1 provides an overview of the financial assets of the Prussian savings banks in our observation period. Unlike government bonds, loans to public authorities were mostly obligations (*Schuldscheine*) which could not be traded at security exchanges (Proettel 2013, p. 11). These loans financed streets, schools, hospitals, energy infrastructure and railroads (Ashauer 1998, 76; Mura, 1998, 109p; Schulz 2006, 29)¹²¹³; in 1859, for instance, the savings bank in Saarbrücken granted a loan to install a water pump, build a running well and lay down water pipes. Proettel (2013, 12) describes the savings bank in Kirchheim unter Teck in the South of Germany granting about 70 loans worth 1.8 million Marks to public authorities in the period 1907 to 1913. Of this, 522,850 Marks were for building schools and apartments for teachers, 436,165 Marks for streets, and 108,300 Marks for water pipes. About 10,000 Marks were used to build a gas plant, which was mainly used by industrial firms. Another loan built a new railroad in 1908, connecting Kirchheim unter Teck to three smaller towns. The main supporters of this project were the businessmen and industrialists, similar to an earlier case in the 1860s. Proettel (2013, p. 13) assumes that this was not an exception, and provides another example from 1907 when a public official from Göppingen, a nearby town, sought a loan from

¹⁰ The stated purpose of the abovementioned first savings banks in Hamburg was, for instance, "*Die Ersparungsklasse dieser Versorgungsanstalt ist zum Nutzen geringer fleissiger Personen beiderlei Geschlechts, als Dienstboten, Tagelöhner, Handwerker, Seeleute errichtet, um Ihnen Gelegenheit zu geben, auch bei Kleinigkeiten etwas zurückzulegen und ihren saer erworbenen Not- und Bautpfennig sicher zu einigen Zinsen belegen zu können, wobei man hoffet, dass sie diese ihnen verschaffte Bequemlichkeit sich zur Aufmunterung gereichen lasse mögen, um durch Fleiss und Sparsamkeit dem Staat nützlich zu sein.*" (§94, Mura 1997, p. 26).

¹¹ Some banks defined their customers very precisely, while others claimed more generally to serve the poorer members of the population. The Bank in Trier, which was located in the Prussian province of the Rhineland, for instance, defined their target group as day labourers, servants, soldiers up to a certain rank and public servants who earned a yearly salary of less than 12 Thalers (Ashauer 1998, p. 55). Others such as the savings banks in Lübeck, Kiel or Göttingen never restricted their target customers (Wysocki 2005 p. 18, Mura 1995, p. 21). Often we find a stated preference for workers, daily labourers and servants but with a provision for other customers to open saving accounts (Wysocki 2005, p. 19). Furthermore, not all banks followed their statutes or guidelines to the letter. Overall, Wysocki (2005, pp. 77) estimates that the original target group, i.e. the poorer members of the population, held about 40-50 per cent of the overall savings in our observation period. Although 40 per cent is lower than originally intended, it still constitutes a respectable amount. In 1900 for instance, 40 per cent of all savings in Prussia was about 2.298 Billion Marks (see Ashauer 1998, p. 64; Höpker 1924, p. 80). Furthermore, the administrative staff of the savings banks themselves believed that the poorer customers from the working class were important for their business.

¹² See also Proettel (2013, p. 7)

¹³ In a recent paper, Atack et al (2014) have also shown that the expansion of banking and railroads in the United States during the industrial revolution were intimately linked and that their relationship evolved over time.

the Kirchheim savings bank because the Göppingen savings bank was already financing a railway for about 80,000 Marks and could not provide another loan. We need to take into account that Proettel's (2013) cases are located in Württemberg and focus on a later period, and might not be representative for Prussia during the period of take-off. Nevertheless, these loans to public authorities made up 8-9 per cent of the total investments of Prussian savings banks, which amounted to 190 million Marks in the period 1856 to 1875.

It is difficult to estimate the extent to which savings banks were directly involved in financing infrastructure, since in the official statistics all bonds and shares held by the savings banks are summarized as "securities" (Ashauer 1991, p. 144). However, a decree issued in September 1844 provides some insight about the typical securities of savings banks. This decree states that loans can only be granted if the securities that were offered as collateral were those in which the savings banks invested. These were German covered bonds ("*Pfandbrief*"), national government bonds, guaranteed railway shares and obligations from the community (cited after Trente 1957, p. 118).

Furthermore, for some cases we have more detailed information on these investments. The savings bank in Aachen, for instance, started to buy shares in railways that had government guarantees and railway obligations in 1842. By 1852, national railway shares and obligations constituted almost 50 per cent of its securities (Thomes 2010, p. 62, pp. 66). Schulte-Rentrop (1937, p. 85) provides more detailed information on the investment policy of saving banks in Westphalia. For example, in 1887 the savings bank in Warendorf held fixed interest railways obligations of 49,500 Marks, which was about 14 per cent of its equity. The remainder consisted of different types of government bonds and smaller investments in gas equities. Based on his findings, Schulte-Rentrop (1937, p. 85) concludes that in the early 19th century, savings banks already contributed a great deal to the German transport network of streets, railways, trams and waterways via government bonds, but also via direct investments. Both savings banks, Aachen and Warendorf, were located in Prussia and are included in our sample.

Savings banks also provided private loans to industrialists. As Proettel (2013) has emphasised, the majority of firms, even by the end of the 19th century, were small and middle sized. By 1882, only 3.5 per cent of employees worked in firms with more than 1000 employees, while more than 50 per cent worked in firms with less than five employees (Burhop 2011, p. 140). Large universal banks, however, mainly focussed on large industrial firms – mainly from the coal and steel sector (see also Tilly 1986, p. 150). Table 1 shows that in mining and salines, 92.4 per cent of the people were working in firms with more than 50 employees, although the

average firm size was about 3 employees. However, it remains unclear how the large number of small and medium sized firms were financed, and we assume that saving banks mattered a great deal to close this gap. There are numerous examples of savings banks providing credit to smaller and medium-sized firms (see for instance Guinnane 2002, p. 88). Compared to the mortgages, however, these seem rather low and thus earlier historical research has rated them as irrelevant to industry financing (Ashauer 1991, p. 144; Mura 1998, p. 109; Schulz 2006, p. 29). However, even though these personal loans might have been relatively small, they can still have a significant impact since small firms and craftsmen did not have large capital requirements. In the years 1858 to 1861 the savings bank in Saarbrücken granted 108 personal loans, with an overall value of about 12,000 Thalers. Nearly half the recipients were craftsmen, i.e. locksmiths, smiths, carpenters and masons. Although nothing is known about the purpose of the loans, it is most likely that they were used to buy land, seeds, machines and raw materials and were therefore important for the local businesses (Thomes 1985, pp. 83). Given the fact that the daily wage of a construction worker was about 1/2 Thalers in 1850 (see Strauss 1963, p. 148), these loans were not insignificant.

In terms of the mortgages, Proettel (2013) makes a convincing case that the savings bank in *Kirchheim unter Teck* often granted mortgages to workers, machinists, gas plant employees, artisans and other industrialists, and that these were used for industrial investments and to finance commercial buildings. In 1908, for instance the textile mill “*W.F. Berger We*” received a loan of 30,000 Marks to build a new spinning room. Although we lack evidence from a Prussian savings bank, it is most likely that Proettel’s (2013) findings can be generalised to Prussian savings banks. At least, they clearly show that there is a misunderstanding and therefore underestimation of the mortgage loans when it comes to financing industrialisation. It is almost certain that they were not solely used to finance private housing.

Altogether, savings banks were not important just in terms of numbers of saving banks, but also in market share compared to other financial intermediaries. Moreover, according to anecdotal evidence and previous historical research, they invested in infrastructure and provided capital for smaller and medium-sized firms in their region. According to Thomes (1985, p. 11), their main achievement was the mobilisation of smaller sums of capital and investing it back into the economy (see also Schulte-Rentrop 1937, p. 57). They are therefore most likely to have had a positive causal impact on regional development. The positive effect on the regions may further increase over time with the accumulation of capital.

3) Empirical Analysis

3.1 Data

City level population figures are taken from Hornung (2015). The data set covers all 978 cities that held city rights in 1849 in Prussia, within its 1849 borders. It also contains population figures for every third year between 1837 and 1871, resulting in 12 years with data and 11,736 city-year pairs.

Data on the existence and number of savings banks is taken from the *Zeitschrift des Königlich Preußischen Statistischen Bureaus* for the year 1876. This volume contains founding dates for all savings banks until 1875 (after which only a few new savings banks were founded). About half the cities (459) in this data set founded at least one savings bank by 1875.

To control for general geographic development patterns and to identify the distance between the savings banks, we georeferenced the location of a city and the location of the savings banks in cities other than these 978 cities, based on location information from online geocoding tools gpsvisualizer.com and geonames.org. We also identified the geographic position using GIS tools and a shapefile of Prussian counties provided by the ifo Prussia Economic History database (iPEHD) (Becker et al. 2014).

Information on railways access is taken from Hornung (2015); data on the share of mining workers in a county in 1882 is taken from the iPEHD. Data on the number of factories, employees and steam engines (steam engines and steam boilers) in a city for the years 1855 and 1858 is taken from the official statistical publication "*Tabellen und amtliche Nachrichten über den Preußischen Staat*" (Königlich Preußisches Statistisches Bureau 1858,1860).

As further control variables we use the city population in 1816 (at the beginning of our observation period), the share of Protestants in a city in 1816, and variables capturing the soil texture (share of a county's area that has clay, loamy or sandy soils in 1866), which are taken from Hornung (2015). We also obtained information on whether a city was capital of a county (Kreisstadt) in a respective year from Hubatsch (ed.) (1976).

Table 2 provides a descriptive overview of the panel data set (Panel A) and the cross sectional data set (Panel B).

3.2 Empirical Approach and Baseline Results

To test empirically whether the anecdotal evidence can be generalized and the foundation of savings banks had a positive and significant impact on urban and regional economic development in Prussia, we rely on a balanced panel of cities.¹⁴ We use population growth as proxy for economic development and regress it on a set of variables representing the savings banks treatment. Population growth can serve as a proxy variable for economic development, because we assume that economic development increased migration to urban centers, while fertility remained unchanged. Generalizing from urban population growth to economic growth has shown to be an acceptable approximation in cases where no data on income is available (Acemoglu, Johnson, and Robinson 2002).

However, in order to establish whether the foundation of a savings bank increased city growth, we would need to know how the cities would have developed if they had not founded a savings bank. To analyse this counterfactual scenario with the help of an elaborate difference-in-differences approach, we would need to construct a control group of cities, which only differ from the cities with savings bank with regard to their decision not to found a savings bank. A particular problem is that there exists no clearly defined starting year of the treatment period. Cities could found a savings bank in any year of our observation period. In a less demanding exercise, we compare the growth paths of cities that founded a savings bank and their growth experience before and after the foundation of the savings bank with the growth patterns of cities that never founded a savings bank. Furthermore, to control for time-invariant unobserved heterogeneity and temporal shocks affecting all cities equally, we include city and year fixed effects. We also include interactions of the location of a city (longitude and latitude) and year dummies to account for changing general geographical patterns of regional development within Prussia. Thus, we estimate the following baseline regression equation using the fixed effects (FE) method:

$$\frac{(Pop_{i,t+1} - Pop_{i,t})}{Pop_{i,t}} = +\alpha_1 \ln(Pop)_{it} + \alpha_2 postSB_{it} + \alpha_3 time_since_SB_{it} + \alpha_4 SBast_{it} * \pi_t + \alpha_5 Countyseat_{it} + \alpha_6 SB\ in\ county_{it} + \sum_{t \in T} \theta'_t Lat_{it} * \pi_t + \sum_{t \in T} \mu'_t Lon_{it} * \pi_t + \pi_t + \delta_i + \epsilon_{it} \quad (1)$$

¹⁴ A similar analysis based on county level was not possible. To get a sufficient number of observations we would need to aggregate the data based on the county borders of 1849. This leaves us with 335 counties and population figures for the years 1849, 1861, 1864, 1867, 1871 and 1875. By 1861, however, 91 per cent of these counties already had at least one savings bank. Thus the variation in the data is insufficient for this type of analysis.

With $\frac{(Pop_{i,t+1}-Pop_{i,t})}{Pop_{i,t}}$ being the growth of population in county or district i between period $t + 1$ and t , π_t are year fixed effects and δ_i are city fixed effects. We use two different treatment variables to capture the structural changes that emerge due to the foundation of the savings bank: $postSB_{it}$ is equal to one for all years after the foundation of a savings bank. Since only 38 of 978 cities had more than one savings bank during the observation period, we do not account for other savings banks that were founded after the first one. $time_since_SB_{it}$ measures the years since the foundation of the first savings bank, for each year t and each city i in the data set. Hence, this variable allows us to analyse whether it takes time for the effect of a newly founded savings bank to emerge. Although we already include city fixed effects that captures particular city specific trends over time, we further control for different path of development between the group of cities that founded a savings bank at some stage and all others. Thus, we include a dummy variable “savings bank at some stage” that is equal to one if the city founded a savings bank in the observation period and zero if we do not observe the foundation of a savings bank until 1875 and multiply it with the year trend " $SBast_{it} * year$ ". Furthermore, we control for potential advantages of towns that were county capitals (*Kreisstadt*) and for the fact that there was already a savings bank in the county ($SB\ in\ county_{it}$). Finally, we include the natural logarithm of a city’s population in period t ($\ln(Pop)_{it}$) to account for the well-known fact that larger cities grow systematically slower than smaller ones. Standard errors are clustered at city level.

The results are in Table 3. As expected, we find that smaller cities grew more quickly than larger ones. Moreover, the effect of savings banks is both statistically and economically significant for both treatment variables. With the introduction of a savings bank, the growth rate increased by about 2 percent. We also find that the effect becomes larger the longer the saving banks existed in the city. Furthermore, the dummy “savings bank” becomes non-significant if we include the variable that captures the time since the first savings bank. Thus, it seems that the effect is a gradual change from the date of the foundation rather than an abrupt change. Most importantly, the variable that shows the trend for the 459 cities that founded at least one savings bank in our observation period is not significant. Thus, there is no evidence that a selection bias drives the results.¹⁵

¹⁵ We also tested whether the impact of treatment duration is non-linear by including the squared number of years since the first savings bank and found it not to be significant. Results are not reported but are available from the authors upon request.

3.3 The decree of 1854 – supporting the spread of public banks

Even when applying a FE estimation and controlling for diverging trends of cities that never founded a savings bank, endogeneity concerns due to the reverse causality issue remain. Cities that experienced a period with high growth rates and where authorities expected the growth trend to stay positive or become positive, probably had a higher incentive to found a savings bank. Thus, the timing of the foundation, i.e. the treatment effect is likely to be endogenous.

However, savings banks were founded in waves, triggered by changes in regulations. The first large wave of foundations started after the general regulation of Prussian savings banks in 1838 (see Figure 2). This was a general legal framework covering organisation, business practices and public control. Within this framework, however, was a wide scope for municipalities. While in 1837 we observe just 136 savings banks, this number had nearly trebled (to 376) by 1849. However, although there was certainly an intention to open savings banks in more rural and less developed areas, it is unclear whether this already happened in this period. Nonetheless, during the 1850s the state authorities continued to point to the economic importance and necessity of savings banks. In July 1854, the minister for trade and commerce, together with the minister of internal affairs, issued a decree that demanded the foundation of at least one savings bank per county in the years to come. This was intended to raise capital to support regional development (v. Knebel-Doveritz 1907). Most importantly, this decree encouraged poorer communities to found savings banks by promising financial support for communities that struggled to bear the costs and risks of founding a savings bank (Thomes 1885).¹⁶ This decree triggered a second wave of foundations. In the period between 1854 and 1865 another 345 savings banks were founded and by 1864, we observe 794 savings banks in Prussia. In our sample of cities, we observe 176 cities that founded the first savings bank in this period. After this boom, the number of foundations per year decreased again. In the years between 1864 and 1875, about 19 new savings banks were founded per year.

¹⁶ The original wording was as follows: “*Dabei sind dieselben (Ländräte) namentlich darauf aufmerksam zu machen, dass die Gelder der Sparkassen sicher und nutzbringend bei den Provinzial-hülfs-kassen untergebracht werden können, so wie dass den Sparern aus dem Stande der kleinen Leute nicht bloss die Sparkassen-Zinsen, sondern auch die von den Hülfs-kassen zu vertheilenden Prämien zu Gute kommen. Ist eine Sparkasse geründet, so erhält sie sich, da sie bei irgend umsichtiger Verwaltung nicht füglich Verlust haben kann, von selbst und an den übrigens an sich geringfügigen Mitteln zur Gründung derselben wird es den Kreisständen fehlen. Sollte dies dennoch nicht der Fall sein, so bin ich, der mitunterzeichnende Minister des Inneren bereit, mit mässigen Summen hinzuzutreten, Ich bemerke aber jetzt schon, dass sie nur ausnahmsweise wird geschehen können, theils weil der zu diesem Behulfe zu Gebote stehende Fonds an sich nicht bedeutend ist, theils weil besondere Umstände, welche dann näher zu motivieren sein werden, vorahnden sein müssten, wenn der Kreis nicht im Stande sein sollte, sie nicht erheblichen Einrichtungs-Kassen aufzubringen.*”

The 1854 decree clearly enhanced the equal distribution of savings banks by requiring the foundation of at least one savings bank per county, and by encouraging poorer local authorities by offering financial support. Thus, while it is possible that the first savings banks were founded in areas that were already prospering, we expect that the degree of industrialisation mattered much less for the founding boom after 1854. The first savings banks were mainly founded in already industrialised areas, such as the Rhineland and Silesia and also in larger cities (see Figure 3). After 1854, the distribution became much wider and the willingness to create good coverage of savings banks throughout Prussia becomes obvious. If we consider the counties within the 1849 borders, more than 90 percent had at least one savings bank by 1865, while in 1854 only about 56 percent had minimum one savings bank (see Figure 4). Furthermore, Figure 4 shows that after 1950 the average city that founded a savings bank was much smaller than in the earlier years. In order to test whether our observation is correct and the foundation of savings banks during the boom years of 1854-1865 was independent of previous economic success, we estimate the following equation using the probit method:

$$P(\text{Savings Bank})_{i,t} = \alpha + \beta * \text{Popgrowth}_{i,t-l} + \gamma * X_i + \varepsilon \quad (2)$$

Where $P(\text{Savings Bank})_{i,t}$ is the probability that the saving bank is founded in period t. In order to be able to determine an event, we only consider cities that founded a savings bank at some stage in the period before 1875. We estimate two separate cross-sectional regressions where t is 1838-1854 and 1855-1865, respectively. The average economic success of the period before a savings bank was founded is proxied by $\text{Popgrowth}_{i,t-l}$ with $l = 3,6$. Thus, this covers either the growth rate in the three years (one period) before the foundation, or the average city growth within six years (two periods) before the foundation of a respective savings bank. X_i covers further city specific variables such as soil texture variables, longitude and latitude, the share of Protestants in 1816 as well as whether there were already savings banks in the county and whether the city was a county seat.¹⁷

The results are presented in Table 4. In the first specification, we include all cities that got a savings bank before 1875, assuming that all these cities could also have founded the savings bank in a different year. In the second specification, we only cover cities that founded a savings bank in the period after 1854. We find a pre-growth trend for the savings banks that were founded before 1854, if we consider the growth up to six years before the savings banks were founded. For the savings banks that were founded after 1854, we find no such trend. Overall,

¹⁷ An overview of the cross sectional data set used for estimating equation (2) is given in Table 2, Panel C.

this simple exercise supports the observations from the anecdotal evidence. The foundation of savings banks in the boom years 1855 to 1865 seem to be rather random. The economic performance in the years before the foundation, the political situation (county seat) or other geographical patterns or resource endowments cannot explain why a savings bank was founded. Still, it is possible that the expectations about future developments determined whether a savings bank was founded in this particular period. However, taking together the anecdotal evidence as well as the empirical results make it most likely that the decree induces a plausible degree of exogeneity and the founded savings banks are most likely not the result of positive or negative selection.

In a next step, we estimate equation (1) again for different sub-samples. These results are presented in Table 5. Columns 1, 4 and 7 show the baseline specification to enable comparison. Columns 2, 5 and 8 show the results only for savings banks founded after 1838, when the first general legal framework for Prussian saving banks was introduced. Finally, columns 3, 6 and 9 depict the estimated coefficients when focusing on savings banks founded in 1854-1865 only, that is, for that sub-sample of savings bank foundations that was founded in the wave following the decree and which we assume to be most likely random. All regressions include city and year fixed effects and interactions of latitude and longitude with year dummies. Standard errors are clustered at the city level. The most important observation is that the effect of savings banks is both statistically and economically significant for both treatment variables and sub-samples. Indeed, the estimated coefficients remain virtually identical across all samples and, if anything, tend to slightly increase for the sample of savings bank foundations of the boom after 1854. Political advantages due to the county seat cannot be confirmed.

As a first robustness check, we test whether the estimated effects are due to a mining industry boom, especially in the Ruhr and Upper Silesia coal industries. If savings banks were founded (and founded earlier) in regions with an economic upswing caused by the growth of the mining industry, this could bias our results. In Table 6 we thus re-estimate equation (1) for all three treatment variables and two different sub-samples. All samples exclude cities in which savings banks were already founded before 1855 or after 1865. The first sample further excludes the five per cent of cities with the highest share of mining workers and the second sample excludes those in the 4th quantile of the mining worker share distribution. Results show that the coefficients of the savings bank variables actually increase in magnitude. Hence, if anything, ignoring coal biases our estimates downwards. Again, this supports our hypothesis that the foundation of saving banks had an especially positive impact on less-developed regions.

Next, we attempt to learn more about the cities that benefitted most. Thus we split the sample into three according to the average size of the city. The first third contains the 326 smallest cities, with the smallest city having just 271 inhabitants, and an average city size of 1380 inhabitants. Most cities (82 per cent in this subsample and 94 per cent overall) had more than 1000 inhabitants. The smallest city with a savings bank was Wirsitz with about 930 inhabitants. The second third contains the middle size cities in the sample. Here, the average city had about 2700 inhabitants. The last sample contains the larger cities. Cities in this sample had an average of 11 320 inhabitants.

If we run the same regressions for the three subsamples, it becomes clear that the effect is not caused by the large cities, but rather by the middle size ones. If we only consider the sample of the foundation wave after 1854, the effects seem even more driven by the smallest cities. Again, our findings provide conclusive evidence that savings banks were particularly useful in less developed and more rural areas.

We also question whether we should consider the foundation of a savings bank in a city nearby as a treatment. This is particularly important if both cities were in the same county, and a savings bank was intended to be accessible to people in neighbouring cities. Such a bank could also have financed public investments and regional business in any city in the county. Furthermore, cities also often benefitted from savings banks across counties. As in the case of *Kirchheim an der Teck* and *Göppingen*, described above, neighbouring savings banks often cooperated to finance large investments that they could not have financed on their own. On the other hand, it is also possible that towns that founded a savings bank experienced substantial relative increases in population, though such growth mainly reflected a relocation of economic activity to the disadvantage of neighbouring cities. Something similar was induced by railways in 19th century Sweden (Berger and Enflo 2017). To study the effect of banks in the neighbourhood of a city we constructed two variables, namely the number of savings banks in each year within 10km and within 20km of a city. We then re-run the regressions where the savings bank dummy is the variable of interest, this time including one of the two neighbour variables. Results are reported in Table 7. They suggest that including the establishment of savings banks in neighbouring cities slightly increases the effect of savings banks for city growth. The effect of savings banks in the neighbourhood seems to be larger than the effect of a savings bank in a city. This is, however, driven by the fact that a notable number of cities had two or more neighbouring savings banks, so that the effect of two, three or four savings banks in the neighbourhood is larger than that of a single savings bank in a city. Furthermore, we see that

the coefficients for the 20km distance band are – while still statistically significant – notably smaller. This suggests that savings bank had a positive impact on the entire region and not just on the town in which they were located. The effect of neighbouring savings banks decreases with distance, which is intuitive as transaction costs increase with distance.¹⁸

3.4 Event Study Results

In this section we estimate an event study specification. This further allows us to identify whether there exists a pre-treatment trend that accounts for our results. Furthermore, it enables us to uncover how the effect of savings banks evolved over time and how long it took for them to significantly affect urban development. In the event study we treat the introduction of the first savings bank in a city as the event (happening in period t) and then define variables for four periods before the event and five periods after the event.¹⁹ Thus, we compare cities at different points in time but at the same stage in terms of the introduction of a savings bank. We include city population, the county seat dummy, city and year fixed effects and estimate the event study specification for three different samples. First, we include the whole sample, then we restrict the analysis to the sample of savings banks founded between 1854 and 1865. Results are shown in Table 9. For the overall sample (column 1) we see that cities with a savings bank showed significantly higher population growth in the period (that is three years) before the foundation of the first savings bank, and, additionally, the coefficient increases relatively little after the opening of the first savings bank. However, for the banks founded between 1854 and 1865 we do not see such a significant pre-treatment trend. This sub-sample of cities does not show significantly higher city growth before the foundation of the first savings bank and the coefficient more than doubles in the year the first savings bank opens. Note also that the estimated coefficients imply a much larger effect than those estimated before – when not accounting for pre-treatment trends and temporal heterogeneity in the effects of savings banks. To be precise, the results suggest that in the period when the savings bank was founded (i.e. within the first three years of its opening) cities grew on average about ten per cent larger than cities without a savings bank. The coefficients and 95 per cent confidence interval for this last sub-sample are also depicted in Figure 5 to give a visual impression of the temporal evolution of the effects. With respect to the temporal evolution, the event study suggests that savings

¹⁸ We also tried a 50km distance band and found that for this neighbour variable the estimate coefficients remain statistically significant but are even smaller. Thus, we have a consistent and economically meaningful pattern of positive spatial spillovers from neighbour treatments declining with distance.

¹⁹ The event window is the result of balancing the advantage of having as many pre and post-treatment periods as possible and a large sample size as e.g. a larger pre-event window would lead us to have to discard a lot of cities with savings banks founded very early.

banks had a significant effect immediately in the period when they were founded (i.e. within the first three years after their opening) but that the effect becomes larger and larger over time (which fits the positive and linear effect of the “time since first savings bank” variable in the baseline regressions). Knowing that it took sometime before growth becomes feasible and also that it took some time to organise the foundation of a savings bank it is unlikely that the savings bank was founded because of the rise in city growth. Thus, the results of the event study further support that the decree of 1854 did introduce a sufficient degree of exogeneity and that the date of the foundation was not endogenous at least for the majority of the savings banks that were founded in the boom after 1854.

3.5 Channels - Financing of Public Infrastructure and Regional Firms

As discussed in section 2, there is qualitative historical evidence suggesting that savings banks financed smaller local firms and business activities, and were also involved in large public infrastructure projects, such as railways and school buildings. To test whether the anecdotal evidence can be generalised and does not simply reflect rare exceptions, we investigate whether cities with a savings bank were more often connected to a railroad and whether they had a larger number of factories and public buildings per capita. Overall, 459 cities in our sample founded at least one savings bank in the time between 1818 and 1875, and 336 cities received railway access. In only 45 cities (about 13 per cent of the cities with railway access) do we observe that railway access preceded the first savings bank. In another 91 cities (about 27 per cent of the towns with railway access), we observe railway access but not the foundation of a savings bank in our observation period. In most cases, railway access came after the foundation of the first savings bank (185 cities and about 55 per cent of the cities with railway access). In only fifteen cities were both institutions founded in the same year or within a two-year period.

In the years after the 1854 decree, 176 cities in our sample founded at least one savings bank. Of these, only 22 were founded in a city that already had a rail access. In six cities the railway access came within two years of the foundation of the savings bank, and 43 cities got railway access after the first savings bank was founded. This took on average about eight years. These observations further complement the anecdotal evidence that savings banks contributed in a meaningful way to railway financing.

In Table 10, we test the role of savings banks for the provision of public infrastructure using a simple econometric exercise. Using Hornung’s (2015) approach, we identified cities that had access to Prussian railways but were not located in the straight line corridor (SLC) between the

large cities. Initially, railways were owned, financed and operated by private companies, but the Prussian government granted licenses for the respective lines. Hence, the railway companies only built the most profitable railway lines that connected larger cities via straight lines.²⁰ If a city was not located between two nodes (large cities) of such a straight line and wanted to have access to a railroad, it had to raise the funds to build its own spur and station (Hornung 2015). Thus, access to funds from a savings bank could have determined whether a city achieved railway access or not. In the regressions in Table 10, two different dependent variables are used. First (in columns 1 and 2) we focus on cities with any kind of railway access. Second, we only consider cities located on the straight line corridor, that is, cities where the government ensured that a railway was built. Third, (in columns 5-8) we focus on cities that have railway access and are not on the straight line corridor, and cities that had railway access and were more than 15km away from the straight line corridor. Again, we address endogeneity concerns by running the regression only on the sub-sample of cities where savings banks were founded between 1854 and 1865. Furthermore, we exclude all cities in which the railway was built before the savings bank and the cities in which railways and savings banks were both founded within a two-year period. We do this to ensure that the coefficient is not influenced by the fact that savings banks were established along railroads.²¹ Results show that, indeed, cities with savings banks had a significantly higher probability of having railway access. The estimated coefficients suggest that cities that were at least 15km away from the SLC and had at least one savings bank were on average about nine per cent more likely to have railway access than similar cities without a savings bank. It is interesting to note that the effect is not significant when we only consider cities located on the straight line corridor, indicating that these railways were financed by sources other than savings banks.

Second, in Table 11 we test the impact of the foundation of savings banks on the number of steam engines per factory in 1855 and 1858 (columns 1 and 2) and on the number of steam engines per capita in those two years (columns 3 and 4). Those machines were necessary for production in almost every important industry, yet they were also costly and external funds from banks were needed to finance them. We include county fixed effects and latitudinal and longitudinal coordinates of cities in the regressions. For both variables, we find a statistically and economically significant and positive impact of savings banks. In cities with at least one

²⁰ However, later the Prussian government started to build railways into previously unconnected, remote areas, e.g. in Eastern Prussia (like the "Ostbahn" in 1848) and took over more and more of the privately operated railway lines (Hornung 2015).

²¹ In a recent paper, Atack et al. (2014) study the economic impact of railway foundation in America. They also exclude areas in which railways were founded before their observation period.

savings bank, there were on average about eight per cent more steam engines per factory than in cities without a savings bank. In sum, the results in Tables 10 and 11 strongly support our claim that savings banks financed regional business and public infrastructure in 19th-century Prussia, and made a significant contribution to national industrialisation.

4) Conclusion

We have provided conclusive evidence that savings banks in Prussia contributed to urban development from 1816 to 1875, particularly of small cities in the more remote areas of Prussia. It appears that examples of savings banks funding communal public infrastructure projects like railways and buildings, and small and medium sized local industries, were not rare and can indeed be generalised. The evidence strongly suggests that savings banks played a pivotal role in Germany's 19th century economic success. German industrialisation was not only based on larger, multinational firms and coal resources, but rather on good public infrastructure, a competitive schooling system and small and medium-sized firms as the backbone of German industry. The resulting, peculiar economic structure of an economy based on various, highly specialised, internationally active, yet regionally centred medium-sized firms has persisted to today, where these firms remain an integral part of the German economic model.

Furthermore, the bank-growth nexus was obviously not limited to the large banks or the time after the foundation of the Reich when the large universal banks were active. Indeed, it is most likely that savings banks were even more important for Germany's industrial take-off in earlier years and in regions in which the majority of the firms were young, and small or medium sized. This study contributes to our understanding of why Germany industrialised, and reveals more about the relationship between banks and growth. We provide evidence that small public and regionally operating financial intermediaries may be equally as important for the transition to modern economic growth as private banks and stock markets, at least at the beginning of an economic take-off when capital requirements are manageable. The history of saving banks can thus be seen as a success story of early economic policy, since the saving banks were clearly communal public institutions and managed to mitigate the detrimental divergence of economic and political core areas and the periphery. Thus, the rise of savings banks in 19th century Prussia has shown that public financial institutions can be instrumental for achieving developmental goals that are still relevant for today's policy makers in developing countries plagued by too high levels of spatial inequalities in economic development.

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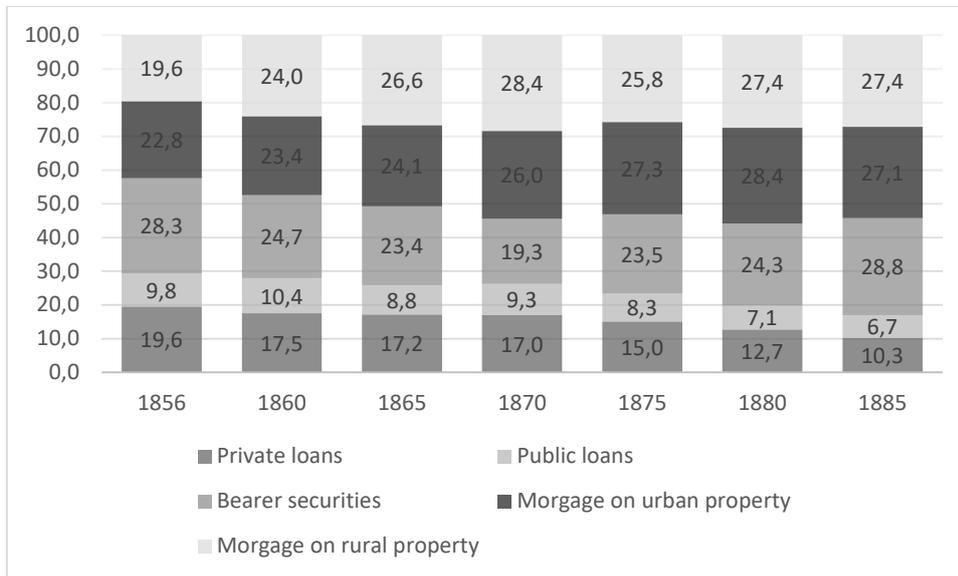
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Tables and Figures

Figure 1: Financial assets of Prussian savings banks in per cent



Source: Ashauer (1998, 77)

Figure 2: Newly founded savings banks

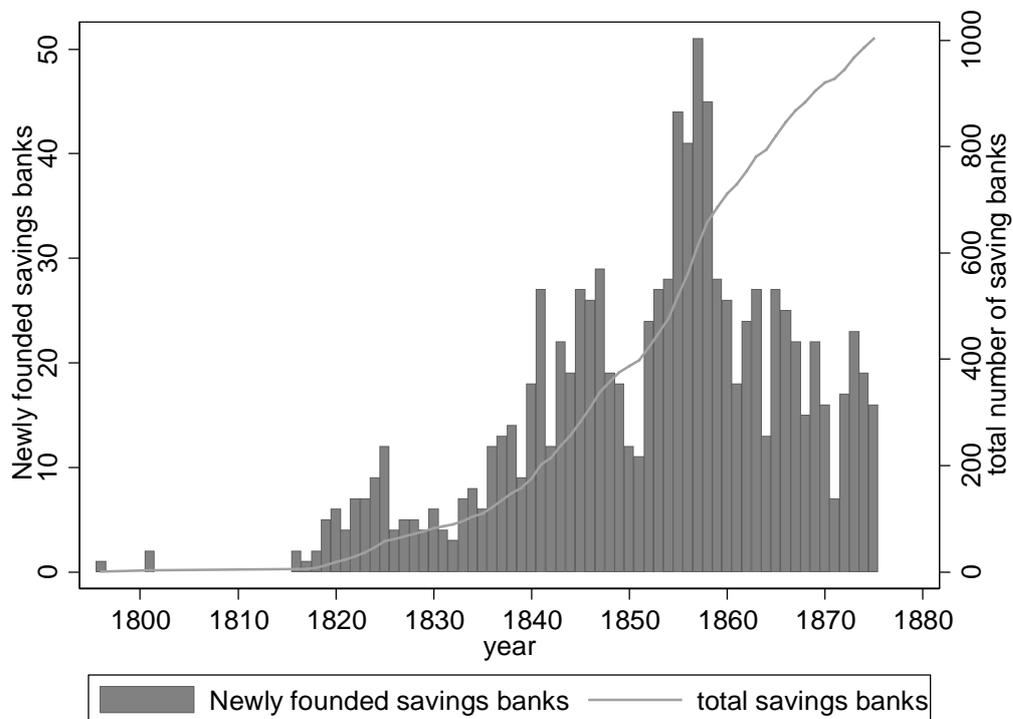


Figure 3: Average population size of cities in the year of foundation

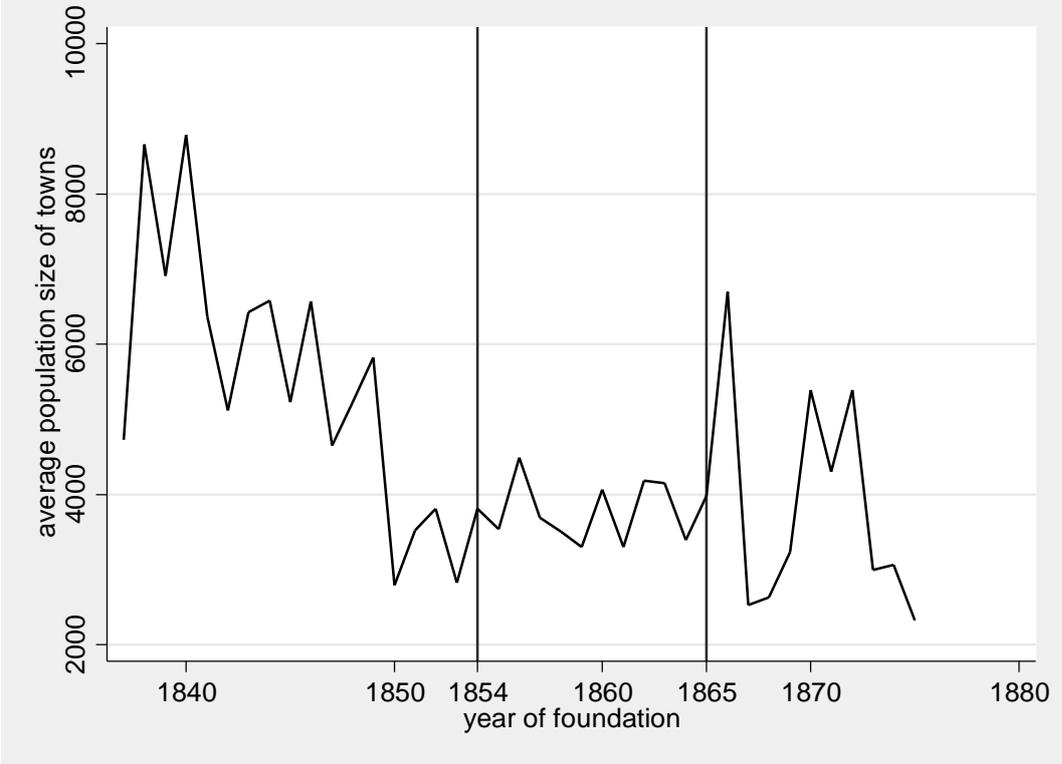
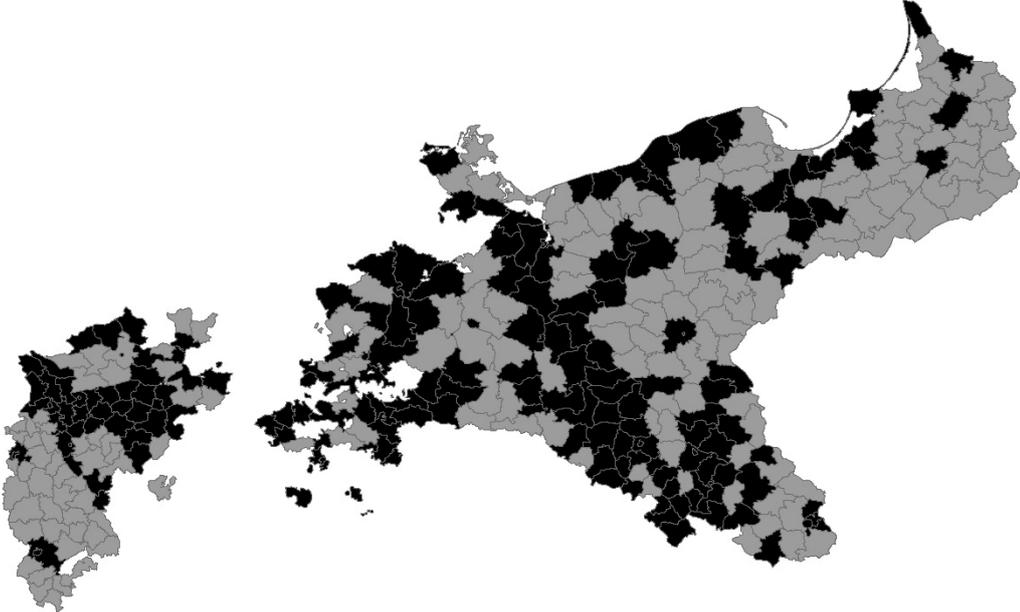


Figure 4: The diffusion of savings banks

Counties with at least one savings bank in 1849 (borders of 1849)



Counties with at least one savings bank in 1864 (borders of 1849)

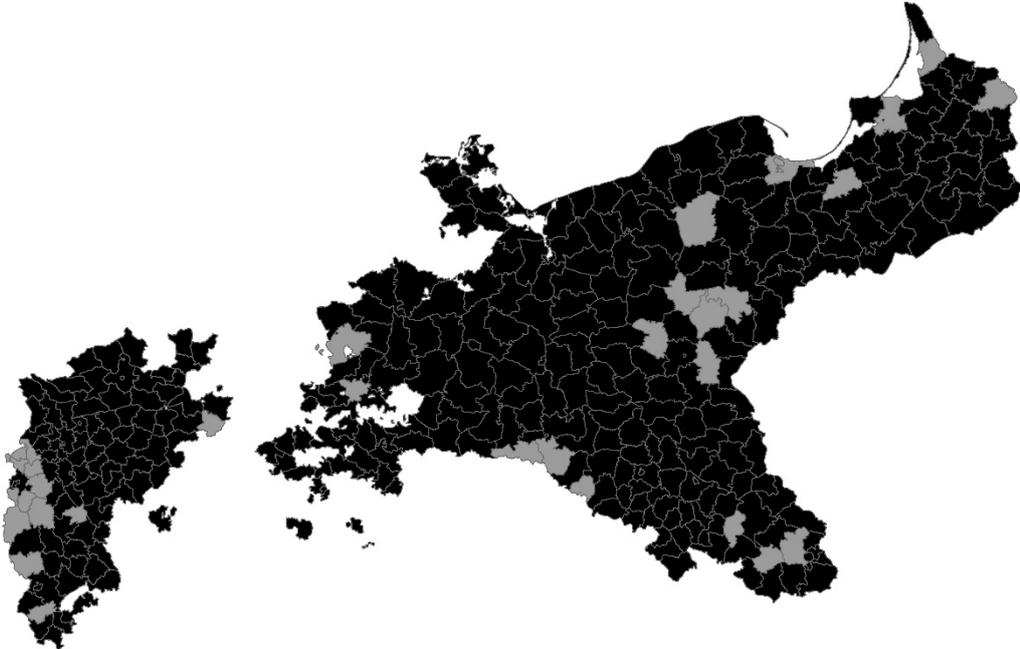


Figure 5: Event study-Savings bank foundation between 1854-1865, (Beta-coefficients and 95% confidence intervals of year dummies, corresponds to Table 10, regression (2))

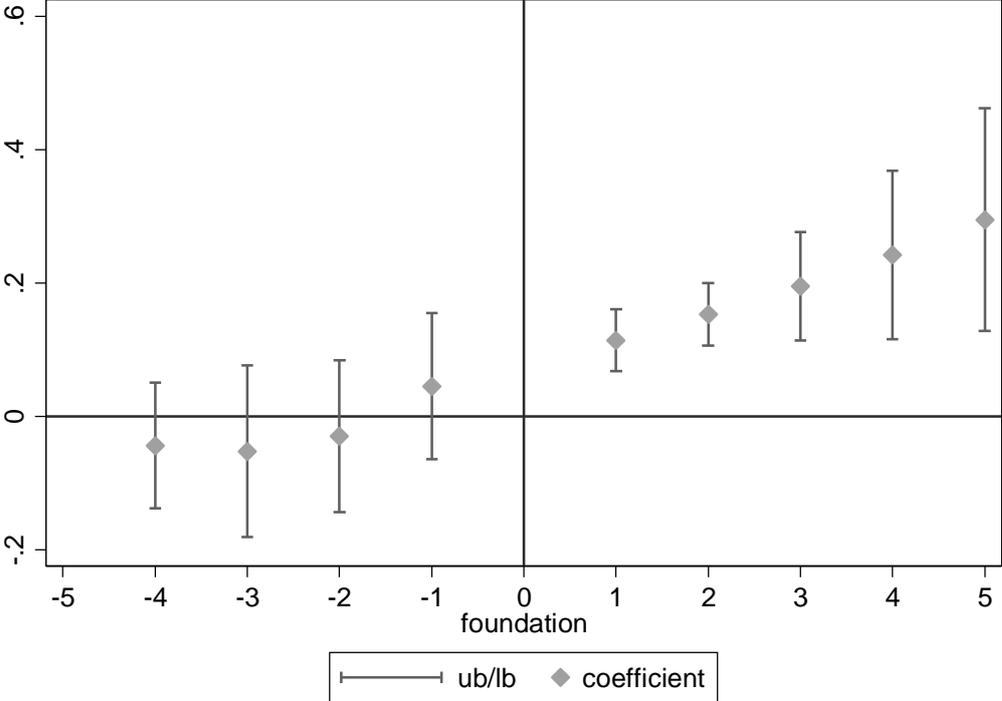


Table 1: Size of Firms in Germany 1882

| | Employees per firm | share of employees in firms with more than 50 employees in percent |
|--------------------|--------------------|--|
| Mining and salines | 81.3 | 92.4 |
| Stones | 6.6 | 33.1 |
| Metal working | 2.8 | 18.7 |
| Apparatus | 4.3 | 46.8 |
| Chemicals | 7.8 | 51 |
| Textiles | 2.6 | 38.2 |
| Foods | 3 | 20 |
| Clothing | 1.5 | 3 |
| Average | 2.6 | 26.2 |

Source: Burhop (2011, 139), data from *Statistisches Jahrbuch für das Deutsche Reich*, 35. (2014).

Table 2: Descriptive Overview of the Data Sets

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|--|--------|--------|-----------|--------|--------|
| <i>Panel A: City-Level Data Set</i> | | | | | |
| City Growth | 11,673 | 0.046 | 0.164 | -0.743 | 7.808 |
| Endogenous Rail Access (>15km SLC) | 11,736 | 0.075 | 0.264 | 0.000 | 1.000 |
| Endogenous Rail Access (not in SLC) | 11,736 | 0.086 | 0.280 | 0.000 | 1.000 |
| Latitude | 11,736 | 52.123 | 1.165 | 49.235 | 55.697 |
| ln(City Population in 1816) | 11,688 | 7.975 | 0.850 | 5.525 | 13.625 |
| Longitude | 11,736 | 13.808 | 4.299 | 6.032 | 22.850 |
| No. of Savings banks within 10km | 11,736 | 0.270 | 0.834 | 0.000 | 9.000 |
| No. of Savings banks within 20km | 11,736 | 1.570 | 2.795 | 0.000 | 25.000 |
| Rail Access | 11,736 | 0.142 | 0.349 | 0.000 | 1.000 |
| Post-Savings Bank | 11,736 | 0.278 | 0.448 | 0.000 | 1.000 |
| Time since first savings bank | 11,746 | 3.931 | 8.496 | 0.000 | 53.00 |
| County Seat (Kreisstadt) | 11,746 | 0.367 | 0.482 | 0.000 | 1.000 |
| Already a savings bank in the county before foundation | 11,746 | 0.615 | 0.486 | 0.000 | 1.000 |
| Steam Engines per 1,000 Inhabitants | 1,954 | 0.091 | 0.380 | 0.000 | 6.780 |
| Steam Engines per Factory | 1,956 | 0.112 | 0.339 | 0.000 | 2.773 |
| Straight line corridor (SLC) | 11,736 | 0.068 | 0.252 | 0.000 | 1.000 |
| <i>Panel B: Cross-Section Data Set Used in Table 4</i> | | | | | |
| Average population growth in the 3 years before SB | 978 | 0.027 | 0.257 | -0.102 | 7.808 |
| Average population growth in the 6 years before SB | 978 | 0.013 | 0.040 | -0.471 | 0.390 |
| Clay Soils | 978 | 0.347 | 0.349 | 0.000 | 1.000 |
| Latitude | 978 | 52.123 | 1.166 | 49.235 | 55.697 |
| Loamy Soils | 978 | 0.322 | 0.230 | 0.000 | 0.996 |
| Longitude | 978 | 13.808 | 4.301 | 6.032 | 22.850 |
| County Seat (Kreisstadt) | 978 | 0.381 | 0.485 | 0.000 | 1.000 |
| Already a savings bank in the county 1838 | 978 | 0.174 | 0.380 | 0.000 | 1.000 |
| Already a savings bank in the county 1854 | 978 | 0.589 | 0.492 | 0.000 | 1.000 |
| Population Growth 1816-1837 | 938 | 0.419 | 1.812 | -0.764 | 52.974 |
| Population Growth 1816-1852 | 948 | 0.759 | 2.266 | -0.705 | 67.553 |
| Population Growth 1837-1852 | 967 | 0.245 | 0.311 | -0.472 | 7.863 |
| Population Growth 1855-1864 | 974 | 0.157 | 0.414 | -0.700 | 8.487 |
| Protestants p.c. in 1816 | 922 | 0.637 | 0.396 | 0.000 | 1.022 |

Table 3: Savings Banks and County Population Growth- Baseline estimates

| Dependent Variable | (1) | (2) | (3) |
|--|------------------------|--------------------------|------------------------|
| | City Growth | | |
| ln(City Population) | -0.212*** (0.0439) | -0.219*** (0.0436) | -0.220*** (0.0437) |
| Post – Savings Bank | 0.0221*** (0.00780) | | -0.000406 (0.0123) |
| Time Since First Savings Bank | | 0.00232*** (0.000428) | 0.00133* (0.000705) |
| Cities which founded a saving bank until 1875 * Year | | | 0.000998 (0.000668) |
| County Seat (<i>Kreisstadt</i>) | 0.00497 (0.0132) | -0.000707 (0.0130) | -0.000448 (0.0131) |
| Already a savings bank in the county before foundation | -0.00394 (0.00503) | 0.00734 (0.00525) | 0.00537 (0.00580) |
| City Fixed Effects | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes |
| Latitude and Longitude*Year | Yes | Yes | Yes |
| Observations | 11,673 | 11,673 | 11,673 |
| R-squared | 0.073 | 0.076 | 0.076 |
| Number of clusters (cities) | 978 | 978 | 978 |

Standard errors clustered on county/city level in parentheses. Coefficient statistically different from zero at the *** 1%, ** 5% and * 10 % level. All regressions include a constant not reported.

Table 4: Probability of Savings Banks Foundation in Different Periods

| Dependent Variable | (1) | (2) | (3) | (4) |
|--|--|---------------------|---|---------------------|
| | Probability that savings bank was founded in 1838-1854 | | Probability that savings bank was founded in 1855- 1865 | |
| Sample | only cities that founded at least one saving bank before 1875, excluding cities that already had a saving bank in 1837 | | only cities that founded at least one saving bank before 1875, excluding cities that already had a saving bank in 1854 | |
| Average population growth in the 3 years before SB | 1.180 (1.113) | | -0.477 (0.921) | |
| Average population growth in the 6 years before SB | | 5.900** (2.701) | | 0.292 (2.446) |
| Protestants p.c. in 1816 | 0.526*** (0.187) | 0.534*** (0.190) | 0.186 (0.314) | 0.167 (0.314) |
| Longitude | -0.0106 (0.0186) | -0.0129 (0.0184) | -0.0257 (0.0311) | -0.0272 (0.0309) |
| Latitude | 0.0217 (0.0756) | 0.0278 (0.0755) | 0.375*** (0.112) | 0.374*** (0.111) |
| Clay Soils | -0.158 (0.940) | -0.226 (0.938) | 0.671 (1.669) | 0.588 (1.646) |
| Loamy Soils | -1.346 (1.033) | -1.497 (1.034) | -0.252 (1.789) | -0.303 (1.770) |
| Sandy Soils | -0.233 (1.040) | -0.242 (1.037) | 0.157 (1.727) | 0.149 (1.706) |
| County seat | 0.165 (0.148) | 0.144 (0.156) | 0.401 (0.264) | 0.402 (0.261) |
| Already savings bank in county by 1838 | 0.388 (0.236) | 0.443* (0.236) | | |
| Already savings bank in county by 1854 | | | -0.315 (0.276) | -0.320 (0.274) |
| Observations | 371 | 371 | 198 | 198 |

Standard errors clustered on county/city level in parentheses. Coefficient statistically different from zero at the *** 1%, ** 5% and * 10 % level. All regressions include a constant not reported. The table shows coefficients obtained from a probit regression.

Table 5: Savings Banks and City Growth

| Dependent Variable | (1) | (2) | (3) | (4) | (5) | (6) |
|--|------------------------|---|--|--------------------------|---|--|
| | City Growth | | | | | |
| Sample | All cities | Excluding town in which saving banks were founded before 1838 | Excluding town in which saving banks were founded before 1854 or later than 1865 | All cities | Excluding town in which saving banks were founded before 1838 | Excluding town in which saving banks were founded before 1854 or later than 1865 |
| ln(City Population) | -0.212*** (0.0439) | -0.222*** (0.0449) | -0.292*** (0.0548) | -0.219*** (0.0436) | -0.228*** (0.0447) | -0.292*** (0.0550) |
| Post - Savings Bank | 0.0221*** (0.00780) | 0.0248*** (0.00788) | 0.0295*** (0.00969) | | | |
| Time Since First Savings Bank | | | | 0.00232*** (0.000428) | 0.00263*** (0.000517) | 0.00270*** (0.000801) |
| County Seat (<i>Kreisstadt</i>) | 0.00497 (0.0132) | 0.0121 (0.0134) | 0.0197 (0.0144) | -0.000707 (0.0130) | 0.00542 (0.0132) | 0.0195 (0.0146) |
| Already a savings bank in the county before foundation | -0.00394 (0.00503) | -0.00133 (0.00534) | 0.00472 (0.00587) | 0.00734 (0.00525) | 0.00617 (0.00541) | 0.00785 (0.00665) |
| City Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Latitude and Longitude*Year | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 11,673 | 10,821 | 8,076 | 11,673 | 10,821 | 8,076 |
| R-squared | 0.073 | 0.073 | 0.087 | 0.076 | 0.075 | 0.086 |
| Number of Clusters (cities) | 978 | 907 | 678 | 978 | 907 | 678 |

Standard errors clustered on city level in parentheses. Coefficient statistically different from zero at the *** 1%, ** 5% and* 10 % level. All regressions include a constant not reported.

Table 6: Savings Banks and City Growth Excluding Mining Intensive Districts

| Dependent Variable | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|--|---|--|--------------------------|--|--|--|--------------------------|--|
| | City Growth | | | | | | | |
| Observations excluded | excluding the 5% most coal intensive cities (more than 4.5 percent of the working population in 1882) | | | | excluding the 25% most coal intensive cities (more than 0.4 percent of the working population in 1882) | | | |
| Sample | All cities | Excluding town in which saving banks were founded before 1854 or later than 1865 | All cities | Excluding town in which saving banks were founded before 1854 or later than 1865 | All cities | Excluding town in which saving banks were founded before 1854 or later than 1865 | All cities | Excluding town in which saving banks were founded before 1854 or later than 1865 |
| ln(City Population) | -0.245*** (0.0457) | -0.311*** (0.0573) | -0.251*** (0.0455) | -0.310*** (0.0575) | -0.278*** (0.0489) | -0.332*** (0.0604) | -0.281*** (0.0489) | -0.331*** (0.0607) |
| Post - Savings Bank | 0.0233*** (0.00827) | 0.0308*** (0.0103) | | | 0.0256** (0.0103) | 0.0323*** (0.0124) | | |
| Time Since First Savings Bank | | | 0.00218*** (0.000430) | 0.00268*** (0.000822) | | | 0.00198*** (0.000468) | 0.00262*** (0.000874) |
| County Seat (<i>Kreisstadt</i>) | -0.000292 (0.0139) | 0.0103 (0.0129) | -0.00468 (0.0135) | 0.0103 (0.0135) | 0.00513 (0.0196) | 0.0207 (0.0130) | 0.000265 (0.0186) | 0.0211* (0.0128) |
| Already a savings bank in the county before foundation | -0.00385 (0.00546) | 0.00510 (0.00623) | 0.00756 (0.00570) | 0.00849 (0.00705) | -0.00289 (0.00688) | 0.00820 (0.00758) | 0.00882 (0.00709) | 0.0121 (0.00861) |
| City Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Latitude and Longitude*Year | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 11,081 | 7,688 | 11,081 | 7,688 | 8,782 | 6,226 | 8,782 | 6,226 |
| R-squared | 0.078 | 0.088 | 0.080 | 0.088 | 0.086 | 0.095 | 0.087 | 0.095 |
| Number of Clusters (cities) | 928 | 645 | 928 | 645 | 736 | 523 | 736 | 523 |

Standard errors clustered on city level in parentheses. Coefficient statistically different from zero at the *** 1%, ** 5% and *10 % level. All regressions include a constant not reported.

Table 7: The Effect of Savings Banks in Small versus Large Cities

| Dependent Variable | (1) | (2) | (3) | (4) | (5) | (6) |
|--|--|--|--|--|--|--|
| | City Growth | | | | | |
| Excluded cities | Sample of | | | Saving banks were founded before 1854 or after 1865 | | |
| | smallest cities (average population below 1951) | middle sizes cities (average population between 1951 and 3655) | larger cities (average population above 3655) | smallest cities (average population below 1951) | middle sizes cities (average population between 1951 and 3655) | larger cities (average population above 3655) |
| ln(City Population) | -0.163*** (0.0233) | -0.183*** (0.0323) | -0.287*** (0.0740) | -0.172*** (0.0266) | -0.196*** (0.0312) | -0.440*** (0.0864) |
| Post - Savings Bank | 0.0250 (0.0189) | 0.0273* (0.0153) | -0.0197 (0.0207) | 0.0241** (0.0118) | 0.0201* (0.0118) | -0.00343 (0.0289) |
| County Seat (<i>Kreisstadt</i>) | 0.0292** (0.0115) | -0.0171 (0.0107) | -0.000655 (0.0240) | 0.0237*** (0.00896) | -0.0123 (0.0126) | 0.0495** (0.0215) |
| Already a savings bank in the county before foundation | 0.00747 (0.00521) | -0.0117 (0.00996) | 0.0352* (0.0193) | 0.00340 (0.00467) | -0.00418 (0.00696) | 0.0492 (0.0352) |
| City Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Latitude and Longitude*Year | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 3,852 | 3,909 | 3,912 | 3,519 | 3,057 | 1,500 |
| R-squared | 0.092 | 0.090 | 0.095 | 0.148 | 0.118 | 0.118 |
| Number of Clusters (City) | 326 | 326 | 326 | 298 | 255 | 125 |

Standard errors clustered on city level in parentheses. Coefficient statistically different from zero at the *** 1%, ** 5% and* 10 % level. All regressions include a constant not reported.

Table 8: Savings Banks and City Growth--Spillovers from Foundations in the Neighborhood

| Dependent Variable | (1) | (2) | (3) | (4) | (5) | (6) |
|--|-----------------------|-----------------------|----------------------|---|-----------------------|----------------------|
| | City Growth | | | | | |
| Sample | All Cities | | | Savings Banks founded between 1854 and 1865 | | |
| In(City Population) | -0.248*** (0.0514) | -0.245*** (0.0491) | | -0.340*** (0.0698) | -0.321*** (0.0642) | |
| Post - Savings Bank | 0.0212*** (0.0075) | 0.0201*** (0.0074) | | 0.0360*** (0.0110) | 0.0333*** (0.0106) | |
| No. of Savings banks within 10km | 0.0415*** (0.0114) | | | 0.0566*** (0.0193) | | |
| No. of Savings banks within 20km | | 0.0130*** (0.0031) | | | 0.0132** (0.0053) | |
| One Savings Bank within 10km | | | 0.0122 (0.00912) | | | 0.0193* (0.0114) |
| Two Savings Banks within 10km | | | 0.0665** (0.0300) | | | 0.0549** (0.0240) |
| Three Savings Banks within 10km | | | 0.217*** (0.0761) | | | 0.357** (0.143) |
| Four Savings Banks within 10km | | | 0.277*** (0.0716) | | | 0.268** (0.117) |
| Five Savings Banks within 10km | | | 0.326*** (0.120) | | | 0.548** (0.223) |
| More than five Savings Banks within 10km | | | 0.121* (0.0659) | | | 0.190** (0.0923) |
| Observations | 11,673 | 11,673 | 11,673 | 8,076 | 8,076 | 8,076 |
| R-squared | 0.084 | 0.082 | | 0.100 | 0.093 | 0.127 |
| Number of Clusters (cities) | 978 | 978 | 978 | 678 | 678 | 678 |

Standard errors clustered on city level in parentheses. Coefficient statistically different from zero at the *** 1%, ** 5% and* 10 % level. All regressions include city and year fixed effects and interactions of latitude and longitude with year dummies as well as a constant not reported.

Table 9: Event Study: Foundation of a Savings Bank and Neighbor Savings Bank

| Dependent Variable | (1) | (2) |
|-----------------------------------|-----------------------|---|
| | City Growth | |
| Sample | All Cities | Excluding Savings Bank foundation before 1854 or after 1865 |
| Foundation-4 | -0.424*** (0.155) | -0.673** (0.270) |
| Foundation-3 | -0.00948 (0.0209) | -0.0455 (0.0489) |
| Foundation-2 | 0.00586 (0.0194) | -0.0544 (0.0666) |
| Foundation-1 | 0.0175 (0.0145) | -0.0320 (0.0588) |
| Foundation | 0.0614** (0.0273) | 0.0427 (0.0564) |
| Foundation+1 | 0.0893*** (0.0168) | 0.110*** (0.0248) |
| Foundation+2 | 0.0960*** (0.0215) | 0.148*** (0.0228) |
| Foundation+3 | 0.105*** (0.0232) | 0.188*** (0.0389) |
| Foundation+4 | 0.135*** (0.0312) | 0.234*** (0.0610) |
| Foundation+5 | 0.158*** (0.0378) | 0.286*** (0.0810) |
| ln(City Population) | Yes | Yes |
| City Fixed Effects | Yes | Yes |
| Year Fixed Effects | Yes | Yes |
| County Seat (<i>Kreisstadt</i>) | Yes | Yes |
| Observations | 3,696 | 1,743 |
| R-squared | 0.099 | 0.171 |
| Number of Clusters (cities) | 398 | 176 |

Standard errors clustered on city level in parentheses. Coefficient statistically different from zero at the *** 1%, ** 5% and* 10 % level. All regressions include a constant not reported.

Table 10: Savings Banks and the Financing of Railways

| Dependent Variable | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|-------------------------------|--|-----------------------|---|---------------------|--|-----------------------|--|-----------------------|
| | Rail access all | | City on straight line corridor (SLC) | | Endogenous Rail Access (not in SLC) | | Endogenous Rail Access (>15km SLC) | |
| Sample | Excluding town in which saving banks were founded before 1854 or later than 1865 | | | | | | | |
| Post-Savings Bank | 0.111*** (0.0189) | | 0.0124 (0.0113) | | 0.0899*** (0.0164) | | 0.0959*** (0.0155) | |
| Time Since First Savings Bank | | 0.0184*** (0.0028) | | 0.00216 (0.0015) | | 0.0154*** (0.0027) | | 0.0178*** (0.0027) |
| City Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Latitude and Longitude*Year | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 6,564 | 6,564 | 6,564 | 6,564 | 6,564 | 6,564 | 6,564 | 6,564 |
| R-squared | 0.111 | 0.191 | 0.015 | 0.018 | 0.096 | 0.166 | 0.103 | 0.196 |
| Number of townkey1849 | 547 | 547 | 547 | 547 | 547 | 547 | 547 | 547 |

Standard errors clustered on city level in parentheses. Coefficient statistically different from zero at the *** 1%, ** 5% and * 10 % level. All regressions include a constant not reported. We excluded all cities in which the railroad was established before the savings bank or within two years after the savings bank was founded to ensure that we capture the right direction of the effect.

Table 11: Savings Banks and the Financing of Regional Business 1855 and 1858

| Dependent Variable | (1) | (2) | (3) | (4) |
|-------------------------------|--|-----------|--|----------|
| | Steam Engines per Factory | | Steam Engines per 1,000 Inhabitants | |
| Sample | Excluding cities in which saving banks were founded before 1854 or later than 1858 | | | |
| Post-Savings Bank | 0.0837** | | 0.0212 | |
| | (0.0329) | | (0.031) | |
| Time Since First Savings Bank | | 0.0646*** | | 0.037** |
| | | (0.0206) | | (0.0187) |
| County Fixed Effects | Yes | Yes | Yes | Yes |
| Latitude and Longitude | Yes | Yes | Yes | Yes |
| Observations | 1,356 | 1,356 | 1,354 | 1,354 |
| R ² | 0.353 | 0.364 | 0.283 | 0.286 |

Standard errors clustered on city level in parentheses. Coefficient statistically different from zero at the *** 1%, ** 5% and* 10 % level.
 All regressions include a constant not reported.