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Abstract

Unter Verwendung eines händisch zusammengestellten Datensatzes, aggregiert auf Kreisebene, welcher die Jahre von 1849 bis 1890 abdeckt, untersucht diese Studie die Auswirkung der Verfügbarkeit von Sparkassen auf das Wachstum des privaten Wohnsektors in Preußen. Sparkassen vergaben hauptsächlich Kredite an kleine und mittlere Unternehmen, Infrastrukturprojekte ihrer örtlichen Gemeinden, Verbraucher sowie Hypothekenkredite. Ihr Geschäftsbetrieb war geographisch auf jene Kreise beschränkt, in denen sich die jeweilige Bankfiliale befand. Um ein gewisses Maß an Exogenität in der Behandlung durch Sparkassen zu erreichen, nutze ich einen Rechtsakt des Preussischen Innenministeriums von 1854, welcher die Kreise dazu verpflichtete, zumindest eine Sparkasse innerhalb ihrer Verwaltungsgrenzen zu gründen. Diese Maßnahme betraf vor allem wirtschaftlich rückständigere Kreise, die zu diesem Zeitpunkt noch keine Bankfiliale gegründet hatten. Durch Verwendung einer OLS-Fixed-Effects-Regression und unter Annahme eines linearen Zusammenhangs stelle ich eine statistisch signifikante positive Beziehung zwischen der Verfügbarkeit von Sparkassen und dem Wachstum im privaten Wohnungsbau für diese Gruppe von Kreisen fest. Bei Betrachtung wirtschaftlich fortschrittlicherer Kreise zeigt diese Studie, dass sich die Beziehung der zwei Variablen durch eine konkave Funktion beschreiben lässt im Zuge derer sich der marginale positive Effekt von zusätzlich verfügbaren Bankfilialen abschwächt. Er ist optimal, wenn ungefähr sieben Banken etabliert sind.

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1 Introduction

Can finance spur economic growth? This question has often preoccupied historians, economists and economic historians. It is beyond discussion that the capitalist economy of the last two to three centuries is firmly interwoven with financial markets. A modern economy is inconceivable without the provision of credit. Can any quantitative relationship be filtered out and measured in the coexistence of the financial and real economies? Can the unprecedented rise in industrial output that took place in the 19th century possibly be traced back to the provision of certain financial services? Or is it as Joan Robinson has put it in 1952: Finance follows where enterprise leads?¹ As clear as a correlation of financial and real sector growth is, as difficult it is to disentangle the two and identify a causal relationship. A particularly large methodological problem of the entire research area is related to endogeneity issues especially induced by reverse causality, i.e. financial development can either be a root cause or a consequence of growth in the real sector (Greenwood and Jovanovic 1990). Therefore, it is particularly difficult to make statements about precedence and consequence or about causality in general.

However, the investigation of specific examples from history and the present can shed light on certain episodes and because of the distinctiveness of its financial markets and the remarkable speed of its industrialization, the case of Germany's finance-growth nexus has fascinated scholars since more than a century (e.g.: Gerschenkron 1966, Wehler 1989, Feldenkirchen 1999, Fohlin 2007).² German universal banks which were engaged in long-term relationships with large joint-stock companies have received a lot of attention and have been assigned a central role in the financing of Germany's economy. In recent years it has been argued that their impact may have been overestimated and researchers' focus shifted towards other forms of banking (Fohlin 1999, Guinnane 2002, Allen et al. 2010, Proettel 2013, Lehmann and Wahl 2021). In this context, this paper draws on a newly compiled county-level

¹Robinson 1952.

²e.g. Riesser 1910, Jeidels 1905 are examples for early, contemporary work.

panel data set and estimates the impact that the availability of savings banks had on economic development in Prussia during the second half of the 19th century. Since GDP data are not available at the county level, the present work resorts to a proxy variable which is to be the number of private houses within a Prussian county.

Savings banks were financial intermediaries that were severely restricted by law in their investment strategy, both geographically and in terms of content, but had the opportunity to tap into previously untouched savings of vast populations.

The findings of this empirical study are twofold. First, exploiting a legal act from 1854 I find a statistically significant positive effect of the availability of savings banks on private housing for a specific group of counties which were affected by the decree of 1854. This law required all Prussian municipalities to establish a savings bank if one did not already exist within the county.³ I argue that this gives some municipalities exogeneity in the timing of establishment of their first savings bank. Assuming a linear relationship between access to savings banks and housing yields no significant results when regressing over all counties.

Second, the statistical relationship between savings bank availability and private housing turns out to be non-linear. The effect of savings banks on private houses in all Prussian counties is strongest when access to bank branches is low and it is maximal when roughly 7 banks are established within a county.

2 Financial Markets, Banks and Industrialization

While demand and supply in the German real sector exploded during the 19th century, so did the need for financial resources and during the first wave of German industrialization - beginning in the 1840s - development in the real economy and in the financial sector went "hand in hand"⁴. In addition to administrative aspects,

³In analogy to Lehmann and Wahl 2021.

⁴Allen et al. 2010, p. 24. Fohlin also characterizes the financing of the German railways as the beginning of Germany's finance-growth nexus.

internal stability and its legal and economic structure, scholars in the past have repeatedly pointed towards the German financial system to explain the country's rapid transition into an industrialized economy (Tilly 1992, Feldenkirchen 1999, Fohlin 2007). The modern discussion has started back in 1966 with publications by Alexander Gerschenkron, in which he addressed the question of why some countries went through the process of industrialization faster than others. He formulated the so-called Gerschenkron hypothesis, according to which countries - like Germany - that are economically moderately backward compared to others grow faster because they benefit from technology transfer from further industrialized regions. This process, however, requires relatively high investment, which in turn increases demand for the provision of credit. At this point financial intermediaries enter the stage to serve the demand (Gerschenkron 1966).

When it comes to the case of Germany a large strand of literature emerged that followed Gerschenkron in what Fohlin 1999 calls the "orthodox" view⁵. It was argued that it were the German universal credit banks that stood ready to provide the large scale finance which was needed for the innovators and entrepreneurs in Germany's heavy industry. In general, universal banks are defined as those financial institutions whose service includes a very wide range of financial services. They offered deposits, long-term and short-term loans as well as the organization of initial public offerings and the issuance of securities. By accompanying firms throughout their whole life-cycle the bankers were not only able to supervise their customers' financial health, they also intervened in executive decision making by occupying supervisory board seats. The investments required were made possible due to the flow of information and the establishment of long-term relationships. Thus, universal banks economized the problem of asymmetric information both ex ante and ex post investment (see also Tilly 1992, Edwards and Ogilvie 1996, Feldenkirchen 1999). In the theoretical literature, this is generally read as the reduction of information and monitoring costs. By gathering information and allocating capital accordingly before the in-

⁵Ibid., p. 309

vestment decision is made they take on the task of evaluating every single possible investment opportunity for the individual investor or saver, comparing them with each other and then making a decision (Boyd and Prescott 1986, Levine 2005, Popov 2018). Ex-post control can materialize through share holder voting rights, seats in supervisory boards or other legal means (Bencivenga and Smith 1993). Moreover, the bankers were in a position to act as what Fohlin 1999 calls "marriage brokers". The wide range of information available to them and their outstanding networking enabled the bankers to initiate and accompany company mergers.⁶

According to the defenders of the orthodox view, universal banks served another important function - risk amelioration. Financial markets can diversify their portfolios more easily than individuals and therefore reduce risks. The risk aversion of individual savers would prevent capital to flow into sectors that promise higher yields because these investments are usually more risky (Obstfeld 1994 and Levine 2005). The sheer size of the universal banks' industrial portfolios implied that they could afford to diversify their assets and compensate for the risk of individual bankruptcies or defaults, protecting whole industries against idiosyncratic shocks (Britton and Kennedy 1983).

Furthermore, banks can promote specialization in an economy by lowering transactions costs. The argument of Greenwood and B. D. Smith 1997 looks as follows: a progressive specialization in an industrializing economy requires ever more different goods, services and thus also transactions. Too high transaction costs can prevent an improved division of labor and thus economic growth. A reduction in transaction costs through financial intermediaries can remedy this problem .

While empirical evidence supporting a positive correlation between financial and real sector development is plentifully available (e.g., Levine and King 1993; Beck, Levine, and Loayza 2000a; Beck, Levine, and Loayza 2000b; Popov 2018), a causal relationship between universal bank assets and economic growth is difficult to establish (Fohlin 1999 and Allen et al. 2010) and in recent decades, the orthodox view

⁶This was also highlighted by Feldenkirchen 1999.

that placed universal banks into the center of the financing of the German industrialization has faced considerable criticism. Empirical evidence demonstrating a causal relationship throughout the 19th century is lacking (Fohlin 1999).⁷ Despite considerations regarding causality, the orthodox view can be challenged from many sides. First, the earliest appearance of universal banks in Germany was around 1848, whereas industrial take-off is traced back to the early 1840s. Therefore, assuming a central role of universal banks during Germany's early phase of industrialization is an anachronism (Fohlin 1999). Second, restrictive economic legislation hindered the establishment of joint stock companies until the 1870s, resulting in sparse clientele for the banks (Edwards and Ogilvie 1996, Fohlin 1999). Many German entrepreneurs operated through legal forms other than joint stock companies, thereby lacking a supervisory board. These small and medium sized enterprises, which were the backbone of Germany's economy, did not engage in long-term relations with universal banks but collected external finance from other sources like savings banks, mortgage banks or credit cooperatives (Born 1983, pp. 107-110, and Thomes 1996). In general, it can be concluded that the orthodox view has overestimated the significance of universal banks. While they hold an important position within the overall structure, they have not been the sole player.

In view of this problem, other forms of financial intermediation have received credit.⁸ These include - among others - the German savings banks, whose importance has recently been highlighted by researchers (Edwards and Ogilvie 1996, Guinnane 2002, Burhop 2006, Allen et al. 2010, Burhop, Guinnane, and Tilly 2018, Lehmann and Wahl 2021). In his aforementioned study Burhop 2006 expresses the role of German savings banks from an empirical perspective. Using a VAR-model he establishes Granger causality between savings banks assets and industrial output growth during 1883 and 1913.

⁷However, there is limited evidence for the period of 1850-1870 in the railway sector where the effect was not substantial (Burhop 2006). This is partly due to the majority of external financing in the railway sector being provided by the state (Borchard 2009).

⁸Fohlin 1999, p. 311.

Hakenes, R. Schmidt, and Xie [2002](#) and Cull et al. [2006](#) particularly emphasize the importance of local financial intermediaries for regional growth. The former especially show the importance of savings banks and credit cooperatives for the external financing of SMEs throughout the 19th and 20th century. By tapping regional information networks and savings these banks contributed to the economic development of their municipalities. The pooling of savings constitutes one of the most important functions of financial intermediaries. In this way, they reduce the costs of having to collect money individually from many single investors or savers. This also shows how important it is that banks, for example, have a good reputation. Especially in the world of the 19th century, when it was not yet commonplace to hand over one's savings to the hands of others. Burghof, Gehrung, and D. Schmidt [2021](#) also emphasize the importance of credit cooperatives and public savings banks especially for regional and local enterprises. They conclude that regional financial markets not only positively influence the local economy but also reduce income inequality.

Of particular note, however, is an empirical study by Lehmann and Wahl [2021](#), who establish a statistically significant link between economic development - proxied by urban population growth - in Prussian cities and the emergence of savings banks within them. They make use of a decree which was issued by the ministry of trade and industry on July 14th 1854 and their work is particularly noteworthy here because the methodological approach to arguing in favor of exogeneity in the savings bank treatment is analogous to the present work. Based on this law, every county which had not founded a savings bank up to this point (which were roughly 40%), was obliged to do so (Pohl [1982](#)). According to the authors, counties which established a savings bank after the implementation of this law did not make an endogenous decision to do so at that particular point in time. Instead, they were exogenously pushed to establishing it.

Taking into account the distribution of all bank assets in Germany in the second half of the 19th century, it is striking that savings banks were consistently one of the most important players, and from the turn of the century even the largest (Table

1).⁹

Table 1: Assets of Different Financial Institutions in % of Total Assets

Type of bank	1860	1880	1900	1913
Central banks	22.4	11.6	6.3	4.4
Credit banks	9.2	10	17.2	24.2
Private banks	35.3	18.5	8.6	4.4
Savings banks	12	20.6	23.3	24.8
Mortgage banks	16.9	26.7	28.5	22.8
Credit cooperatives	0.2	4.4	4.1	6.8
Others	4	8.2	12	12.6

source: Guinnane 2002.

Not only the sheer size of their assets, but also their legal and operative design make them interesting. The majority of the branches were held publicly by a city, town or the county where they were founded in. Whichever authority held such a bank was also liable for its assets. Especially the Prussian savings banks were subject to the so-called *Regionalprinzip*, an aspect of Prussian law that obliged savings banks to conduct their business activities within the district whose authority was responsible for them (Lehmann and Wahl 2021). Additionally, they were promoted by the government explicitly as a means to enable the lower classes to save money at interest, i.e. they accessed previously untapped savings (Seidel 1908). Many savings banks were so-called closed banks, which meant that their services could only be accessed by poorer people of the working or peasant classes (Guinnane 2002). Due to restrictions on both the choice of customers and the region in which they could conduct business, these banks were financial intermediaries that returned the savings of a particular segment of the population (that of one specific county) to that very segment via credit, which is an advantage and disadvantage for local economies at the same time. The favourable aspect is, that the geographic restriction of the business prevents a capital drain from poorer to richer regions - the so-called "de-

⁹A description of the banks' business models can be found here: Burhop, Guinnane, and Tilly 2018.

posit siphoning” (Guinnane 2002), where savings being pooled in one region but being invested elsewhere. Hakenes, R. Schmidt, and Xie 2002 have shown that this is generally true for regionally active banks as long as access to international capital markets is limited. On the contrary, the *Regionalitätsprinzip* imposes very severe constraints on the optimal allocation of funds. Consequently, an interregional and thus also intersectoral distribution can hardly be realized, implying an environment that exposes the banks to a fundamentally higher risk as diversification is hardly possible (Burhop 2006). This can be countered by the fact that the investment strategies of the savings banks - as will be shown below - were very conservative, risk-averse and secured by the state.

The savings banks’ lending behaviour mainly rested on three pillars. First, during the period of 1851 - 1913 they invested roughly 55% of their assets into mortgage finance. These mortgages were primarily used to build private houses and divide estates in case of inheritance in urban as well as in rural areas. Moreover, they were lending to small and medium sized enterprises, covered by real estate. Second, the savings banks were engaged in holding government bonds of their local municipality which accounted to about a third of their assets. The funds generated via this channel were mainly used to finance regional and local infrastructure projects or to buy industrial goods. Within a case-study framework of one specific savings bank Proettel 2013 shows that the public projects the savings banks were invested in were manifold and highly diverse.¹⁰ Third, they offered the opportunity to grant consumer loans (Ashauer 1991)¹¹. This combination of different investments was far from coincidental but rooted in targeted policy-making by the Prussian state. When administrators became increasingly aware of the rising importance of savings banks, a decree was issued in 1838¹² stating that while the banks were obliged to invest in conservative, less-risky assets these were also secured by the state (Hoff-

¹⁰They would grant loans to the government in order to build schools, canals, rail tracks, roads or water pipes.

¹¹Table 30/31. Cited in Guinnane 2002.

¹²*Reglement die Einrichtung des Sparkassenwesens betreffend, vom 12. Dezember 1838.*

mann 1926).¹³

Taking all this together, it can be concluded that the Prussian savings banks may have contributed to the economic development of their counties through various channels. By granting real estate loans, they promoted the construction sector and its related industries. Financing infrastructure projects improved the economic starting position for resident and potentially resident companies and craftsmen, which in turn improved the situation on domestic markets. Additionally, a certain amount of the wealth gained in this way ended up in the savings accounts of the population and could thus flow back into the cycle.

Of all the many-fold functions performed by financial systems which were described above the savings banks were capable of serving them all with differing intensity. Due to savings banks being regional lenders and thus being exposed to low levels of information asymmetry, the potential for a reduction of ex ante information costs and ex post monitoring costs was arguably lower as compared to the large universal banks.¹⁴ Furthermore, it was already mentioned that because of geographical restrictions risk amelioration through diversification was hardly possible. Nevertheless, the great advantage was the savings banks' ability to tap on the savings of the masses.

Putting all of that together, economic theory strongly suggests that the Prussian savings banks promoted the economic development of their counties, but there is not yet sufficient empirical research on this. There are still some dark spots in the literature when it comes to a quantitative description of the relationship between the financial sector and the real sector. In the following section I will add on this discussion and statistically examine the effect of savings banks on private housing in Prussia. By doing so, this study differs from previous work (e.g., Lehmann and Wahl 2021, Burhop 2006) in three respects. First, I examine counties rather than

¹³The banks were also quite free when it came to adapting to special circumstances within their counties. A deeper discussion of investment heterogeneity across different geographical areas would lead too far here, but more on that can be found at Hoffmann 1926, p. 41-78.

¹⁴With a similar argument: Burhop 2006.

individual Prussian cities or the entire German economy. Savings banks, serving as local lenders, operated within a specific county. Therefore, analyzing their impact on local economies is best suited at this level of aggregation.

Second, I extend the existing analysis by exploiting a new proxy variable - private housing - which has not been done before. Using the degree of private housing in a county to measure economic development over time can be a useful approach and there is plenty of empirical evidence in favor of a positive relationship (Burns and Grebler 1977, Pietroforte and Bon 1999), especially in developing economies (Pietroforte, Bon, and Gregori 2000). The construction of private houses requires the use of various resources such as land, building materials, and labor and therefore can have a positive impact on other industries. Several studies were able to pin down multiplier-effects of the construction sector on other businesses attached to it (e.g. Pietroforte and Gregorio 2003). Moreover, the construction of private houses is often driven by demand from individuals who are looking to settle in a particular area. If a region is experiencing economic growth, it is likely to attract more people who are seeking employment opportunities or a better quality of life because the region may have better public services like schools or hospitals. As a result, the demand for housing is likely to increase, leading to growth in the number of private houses. Thus, a change in construction activity in the private sector can be an expression of an economic development that is taking place and also, by itself, stimulate demand for goods, services and labor in other businesses.

Third, the data used here have not yet been used for such analyses. The panel data set used is newly compiled and was obtained from official publications of the Prussian administration. The following chapter describes how I proceeded in doing so.

3 Private housing and savings banks

3.1 Data collection

The data which are used here stem from different publications of the *Königlich Preussisches Statistisches Bureau in Berlin*. I hand-collected data on the amount of private residential buildings in Prussian counties. The data were available for the years 1849, 1864, 1867, 1871, 1875, 1880, 1885, and 1890. Since the beginning of the 19th century Prussian administrators would conduct censuses every three years from 1819-1867, as profits from the German Customs Union were distributed according to population. Later on, during the years preceding and following the foundation of the German Empire it was first published every four years 1867-1875 and afterwards every five. Doing so, not only the amount of inhabitants was reported by the Prussian communities - they collected statistics on a huge variety of subjects. Starting from information on livestock and land-ownership, up to fire insurance and teacher-student ratios, up to the amount of private residencies and factories. The results were either published individually or were part of monthly or annually published magazines (e.g. *Zeitschrift des Königlich Preussischen Statistischen Bureaus*). If these publications survived the two World Wars, German division, reunification and the Soviet rule, they can be found digitized on the web-page of the Münchner Digitalisierungszentrum or the Deutsche Digitale Bibliothek.

Data collection and their publication was not conducted uniformly during all censuses. That means the censuses' results differ in the kind of information that is reported and in the granularity at which they are assembled. Throughout the years most information is aggregated on province and *Regierungsbezirk* level or it is distinguished by city size. As this high level data would not allow for appropriate precision this paper relies on county-level data. Information on the number of private residencies in the respective counties is available for the years 1849, 1864, 1867, 1871, 1875, 1880, 1885, and 1890. The definition of a private residential building and the method of counting them were straightforward. First, a building was considered

as one unit if everything inside it was under the same roof. Second, a building was categorized as residential if people lived in it and it was not used for public services, commercial or economic purposes, nor served as a home for government officials. The implementation of the census was the responsibility of the respective municipalities. For this purpose, the Statistical Office distributed so-called location lists (*Ortslisten*) to be completed and returned by the local administrators.¹⁵ These contained a lot of question regarding the community itself, among those question for the amount of commercial houses, private houses, fire insurances, demolished buildings, etc.¹⁶

It is a peculiarity of data that is aggregated on the level of administrative units that these units underlie changes. Basically, counties were designed such that every inhabitant would be able to travel to the administrative center within one day and the population was meant to cover around 20,000 - 36,000 inhabitants. Therefore, when population and city sizes would increase to such a level that the administrative workload could not be met properly new counties were founded. Usually, a county was split into two or more sub-counties. So, in 1849 - the earliest observation of the data set applied here - there were 335 counties in existence, spread over 25 regions (*Regierungsbezirke*) in 9 provinces. Leaving out the areas that joined the Prussian state after the war of 1866¹⁷, in 1890 there were already 425 counties. To guarantee comparability over time, it is necessary to aggregate the data back to its original administrative structure. This comes along at cost in variation but is needed to avoid measurement errors. Moreover, it is important to note that the original territorial boundaries were preserved.¹⁸

The procedure to aggregate properly is as follows. All 335 counties can be assigned to a unique identifying number throughout their history. These are provided by the

¹⁵ *Zeitschrift des Königlich Preussischen Statistischen Bureaus*, 1866 = vol. 6, p. 84.

¹⁶ An example can be found here: *Zeitschrift des Königlich Preussischen Statistischen Bureaus*, 1860/1 = vol. 1, p. 181.

¹⁷ Hannover, Hildesheim, Stade, Lüneburg, Aurich.

¹⁸ This procedure is common in empirical research on Prussian economic history. It is recommended on the webpage of the Ifo Institute: <https://www.ifo.de/en/welcome-ipehd-ifo> Prussian economic history database (last seen 10.05.2023).

ifo Prussian Economic History Database (IPEHD)¹⁹. When new counties enter the stage in a later observational period, they are assigned to the identifier of the 1849 county from which they originated. This step is repeated until the last year available in the data - 1890 -, leading to 425 observations with 335 unique county identifiers. In a last step counties are grouped by their respective numbers and variables are aggregated with a simple sum function.

The county of Duisburg in the region of Düsseldorf shall be used here as an illustration. In 1849 it had the identifier 289. Over the course of the years it was split up several times, at first into two: Duisburg and Essen. Later on, Essen itself was again divided into an urban and a rural part. The remaining part of Duisburg continued to grow and another county was spun off from it - Mülheim Ruhr. This again, grew and was split up such that in 1890 the five counties of Duisburg, Mülheim Ruhr, Ruhrort, Essen city and the rural district of Essen all originated out of Duisburg and all of them would be a unique county on their own. In the county's observation of 1890 all of them are summarised under the unique identifier of 289. Note that Essen as a county did not continue to exist on its own after as it was divided into two parts, which is why house count is 0 here.

Table 2: The example of Duisburg in 1890

	county 1890	region 1890	houses 1890	identifier 1849
1	Duisburg	Düsseldorf	4,585	289
2	Essen	Düsseldorf	0	289
3	Essen Land	Düsseldorf	12,869	289
4	Essen Stadt	Düsseldorf	4,853	289
5	Mülheim a. d. Ruhr	Düsseldorf	8,770	289
6	Ruhrort	Düsseldorf	8,441	289

In the final data set then, the housing variable for county 289 (originally Duisburg)

¹⁹available on the webpage of the IPEHD.

in year 1890 is represented as follows:

$$\text{houses}_{1890}^{289} = 4585 + 12869 + 4853 + 8770 + 8441 = 39518 \quad (1)$$

The data on foundation years and locations of savings banks is also made available by the *Königlich Preussisches Statistisches Bureau in Berlin*. In the 1876 edition of their *Zeitschrift*, a list of all Prussian savings banks, their foundation year and location was published and kept updated in subsequent years. This data was not collected by the author - it was made available by Sybille Lehmann-Hasemeyer and Fabian Wahl who made use of it in another study.²⁰ Again, the information had to be assigned to the correct administrative entity. This was done in a procedure analog to what was done with the housing data. Sybille Lehmann-Hasemeyer and Fabian Wahl already assigned the unique identifiers from 1882 to every single savings bank. As every county in 1882 can be traced back to its predecessor in 1849, the data had only to be merged with respect to the relevant numbers for 1849. After merging all affected counties and combining the housing and savings banks data we are left with two major data sets. First, a panel data set with 2680 county-year pairs (335 x 8) and second a masterdata set that consists of information on 335 county units. For each observation in the panel it contains information on housing and savings banks. In Table 3 the most important information for each observation is displayed. Each county-year pair contains data on its unique identifier for the year 1849, the (original) county name, the amount of private houses in the county, the number of savings banks in the county and the year of foundation of the county's first savings bank.

²⁰Lehmann and Wahl 2021.

Table 3: Duisburg’s representation in the resulting panel data set

	kreiskey1849	county	year	houses	no. sb	first sb
1	289	Duisburg	1849	12602	8	1840
2	289	Duisburg	1864	20397	11	1840
3	289	Duisburg	1867	23297	12	1840
4	289	Duisburg	1871	23889	12	1840
5	289	Duisburg	1875	34053	12	1840
6	289	Duisburg	1880	33335	15	1840
7	289	Duisburg	1885	34983	19	1840
8	289	Duisburg	1890	39518	24	1840

As was already mentioned earlier the aggregation procedure comes at the cost of variation but is inevitable if temporal comparability shall be achieved.

Going from here, a lot of other variables of interest can be retrieved. These are for example time that has passed since the foundation of the first savings bank, the absolute growth in housing from one period to another or the yearly average growth in housing. The next section will present a descriptive analysis of the data and an empirical estimation of the relationship between savings banks and private housing.

3.2 Development of private housing

In terms of private sector construction activity, there is a lack of systematic studies focusing on Prussia during the 19th century. However, there are comprehensive studies available on urbanization, which pertain to population growth in cities and the overall population expansion in Prussia. Notably, scholars such as Matzerath [1985](#) and Kollmann [1969](#) argue that the process of urbanization in Prussia adhered to a pattern similar to industrialization. According to their research, urbanization experienced initial growth during the 1840s, accelerated until the mid-1870s, and then continued to increase until World War I. The focus of these studies primarily revolved around the process of urbanization, which refers to growth in the population residing in cities. This may not be precisely the same as a general rise in

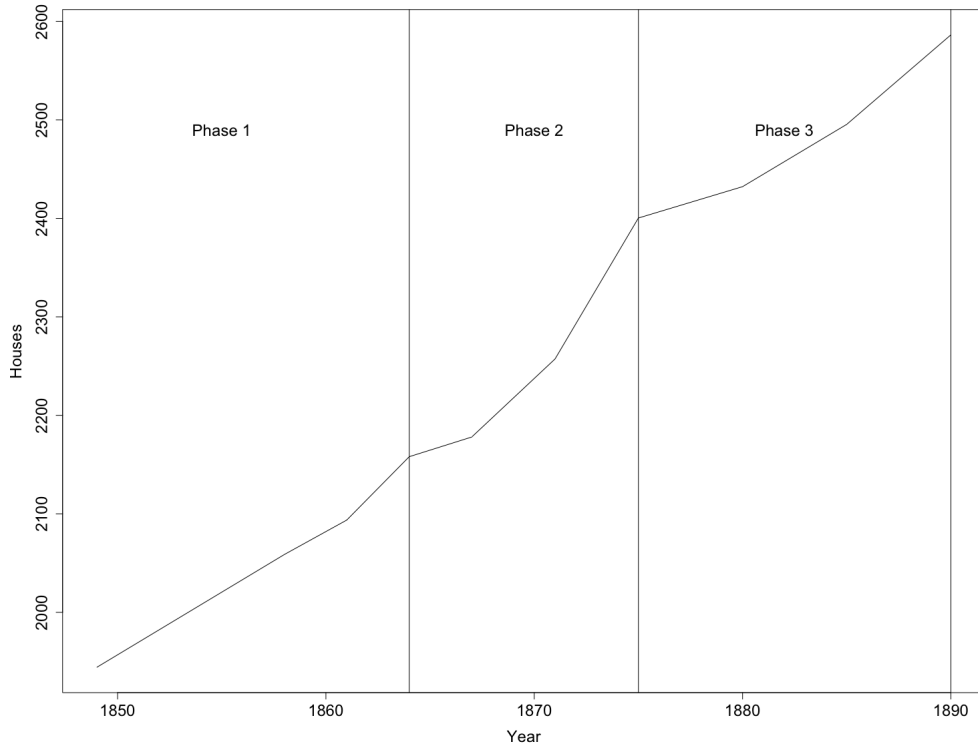


Figure 1: Cumulated private houses in Prussia 1849-1890 (in 1000s)

private residential buildings, but still it is reasonable to anticipate a similar trend intuitively.

Figure 1 shows the overall development of private housing in Prussia from 1849 until 1890 how it is reported in the official publications from which the data used here are retrieved.²¹ The y-axis depicts cumulated private residencies in thousands. To provide an overview, I divide the development of construction activity in the private sector, which is depicted in Figure 1, into three phases. A first one, starting in the 1840s and ending with 1864 as the previously accelerating development initially slows down. Note that observations in 1858 and 1861 are constructed via data on province-level. Hence, these are not available for the county-level analysis. The second phase starts in 1864 and is characterized by an accelerating growth in private residencies until 1875. The third phase ranges until 1890 and represents a consolidation phase with weaker growth than before.

²¹Note that the new provinces that entered the realm in 1866 are not included.

Prussia had great regional differences in population, socioeconomic attributes and hence the degree of housing across its provinces. For example Hohorst 1984 shows that there existed a strong West-East-divide in incomes throughout the 19th century. While the western regions were more urban and more industrialized the eastern parts relied more on agriculture and handicraft (Pierenkemper and Tilly 2004). Figure 2 shows the geographical distribution of private houses in 1849 and suggests that the housing data at hand reflects the income disparities.

The more urbanized regions with more private houses lie towards the south and west of Prussia plus Saxony in Prussia's center. According to Pierenkemper 2007 Germany experienced its industrial take-off in the 1840s. Increased production and demand for rail lines led to a sharp rise in demand for iron, coal and steel due to the high intensity of raw materials needed in this sector. This in turn demanded improved transportation networks and a self-reinforcing cycle got underway and German output per capita grew exponentially in the following decades (Fremdling 1979).

Figure 2 depicts the distribution of private houses across Prussia when this process took off - the darker the color of a county, the more houses it has and displays that the situation presents itself in a differentiated manner. The number of private residential houses in a county varies widely ranging from 1500 to 14500. Particularly noticeable is the apparent pronounced west-east gradient. The western provinces towards the Rhine contain counties that have significantly more houses compared to the eastern areas, which seem to be less urbanized. Additionally, there is an observable tendency of more houses in the southern provinces around Silesia. The darker areas, i.e. those with more houses were regions which had plenty of raw materials, mainly coal.

During the following decades not all regions industrialized equally. While certain regions, such as Saxony or the northern Rhineland became very heavily industrialized, other areas more or less lagged behind or developed sustainable growth rates only in certain sectors, as seen in areas in Silesia or the southern Rhineland. Moreover,

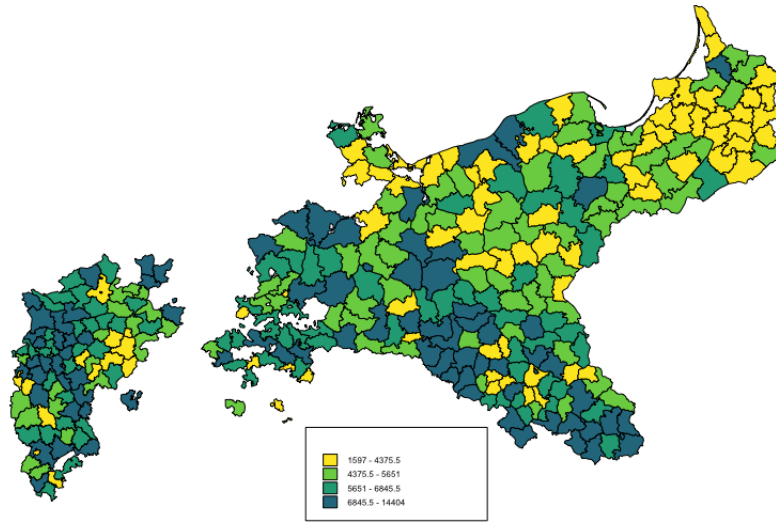


Figure 2: Regional dispersion of private housing in year 1849.

especially in the eastern provinces of Prussia, people were engaged less in heavy industry and much more in craftsmanship combined with agriculture. These areas include above all Posen, Pomerania and both West and East Prussia. Interestingly, Silesia, which was actually rich in raw materials, fell more and more behind in the course of the century due to poor connections to the railroad and road network. (Wehler 1989, S. 627, Siemann 1997, p. 99 ff.). This industrial development is also reflected in the evolution of private residential houses, as shown in Figure 3. It shows the average yearly growth rate of private houses between 1864 and 1875. Heavily industrialized regions in the west showed relatively high growth rates in housing between 2% and up to more than 8% while the southern parts started to lose the connection. A significant portion of the southwest region falls within the range of negative growth rates, ranging from below -1.5% to 0.5%. Surprisingly, parts of the eastern provinces also show a relatively strong growth in urbanization but do barely reach average growth rates of above 2% per year.

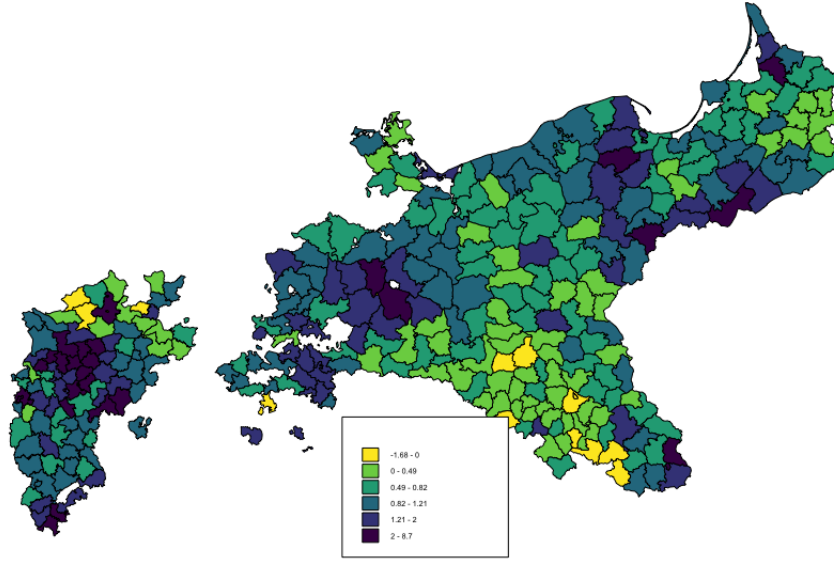


Figure 3: Yearly growth rates of private housing 1864-1875.

During the years 1875-1890, a consolidation and solidification of this trend can be observed. With a few minor exceptions, the central and northwestern provinces such as Saxony, Brandenburg, and Westphalia are driving the overall upward trend, with annual growth rates of private residential houses reaching over 5.5%. Major parts of the southern regions even exhibit a decline in private houses, showing negative yearly growth rates of less than -2% (see Figure 4). Throughout the whole time span from 1849 to 1890 the highest growth rates can be observed in the western provinces and central parts, followed by the east, with the southern Silesian parts exhibiting the lowest growth rates.

In summary, the development of private residential properties shows to be a process that exhibits significant temporal and spatial variations. The geographical differentiation arises from the fact that different regions benefited to varying degrees from Germany's progressing industrialization. From this perspective, it can be observed that the housing data serves as a proxy for economic development and reflects the overall economic situation in different parts of Prussia.

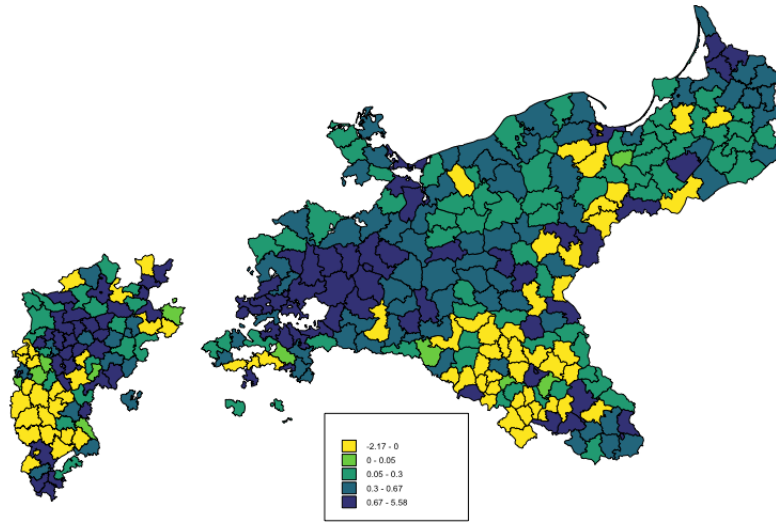


Figure 4: Yearly growth rates of private housing 1875-1890.

3.3 Emergence of savings banks

Can we retrieve similar patterns from the data on savings banks foundations? Do the counties where a lot of construction activity is located also have more pronounced regional financial markets? When and where were Prussia's savings banks founded?

Taking into account the 335 counties subject to this study the emergence of savings banks also occurs in waves. While only few are founded in the early decades of the century, the development takes off after 1838, displayed in Figure 5. As was already mentioned earlier, in this year the Prussian government issued a decree which created the first comprehensive legal framework for savings banks and their markets. Better planability and legal security triggered the foundation of the first major wave of Prussian savings banks. Starting off with five new savings banks that were founded in 1837, this number quadruples until 1853. In 1854 subsequently, the Prussian ministry of the interior issued a law that demanded every county to found a savings bank that didn't have one at this point in time, also offering financial

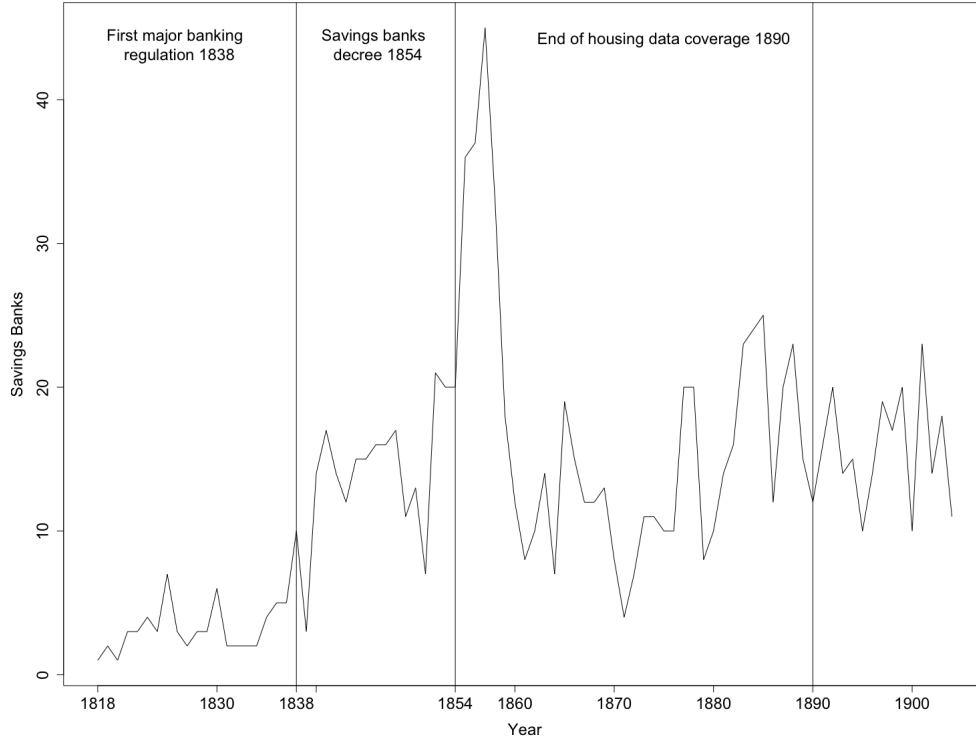


Figure 5: Number of newly founded savings banks across all counties

support in case the local administrators needed it (Pohl 1982). Consequently, the second foundation wave occurred immediately afterwards with 36 new banks in 1855 followed by 37 in 1856 up to 45 in 1857. During the next decades it can be observed that foundations oscillated at a significantly lower level roughly between 20 and 5 per year.

In order to be able to make statements about the relationship between private residencies and these savings banks it is important to exploit regional as well as temporal variation in the establishment of savings bank branches. Intuitively, counties with in general better economic conditions should tend to found banks in order to serve demand for credit. That means their decision to form a savings bank is made endogenously. While Figure 5 shows the total amount of savings banks that were founded per year, Figure 6 shows how many first savings banks were founded in a year or more intuitively: how many counties founded their first bank in a specific year. For example the interpretation for 1838 would be: In 1838, 8 counties founded

their very first savings bank. That is, the timing of the decision to found a savings bank for the first time is the aspect of interest. It can be observed that the two curves follow a similar pattern. A first wave of counties starts founding savings banks after 1838, a second one after 1854. At first sight, it can be said that the decree of 1854 indeed triggered the foundation of a savings bank in many counties. Furthermore, the majority of the banks that were founded in the aforementioned second wave are also the first ones in their respective counties. Additionally, we see that after the 1860s there are hardly any counties founding a first savings bank left. This is because the vast majority of counties has already founded at least one. In 1865, 92.5% of all counties had a savings bank.

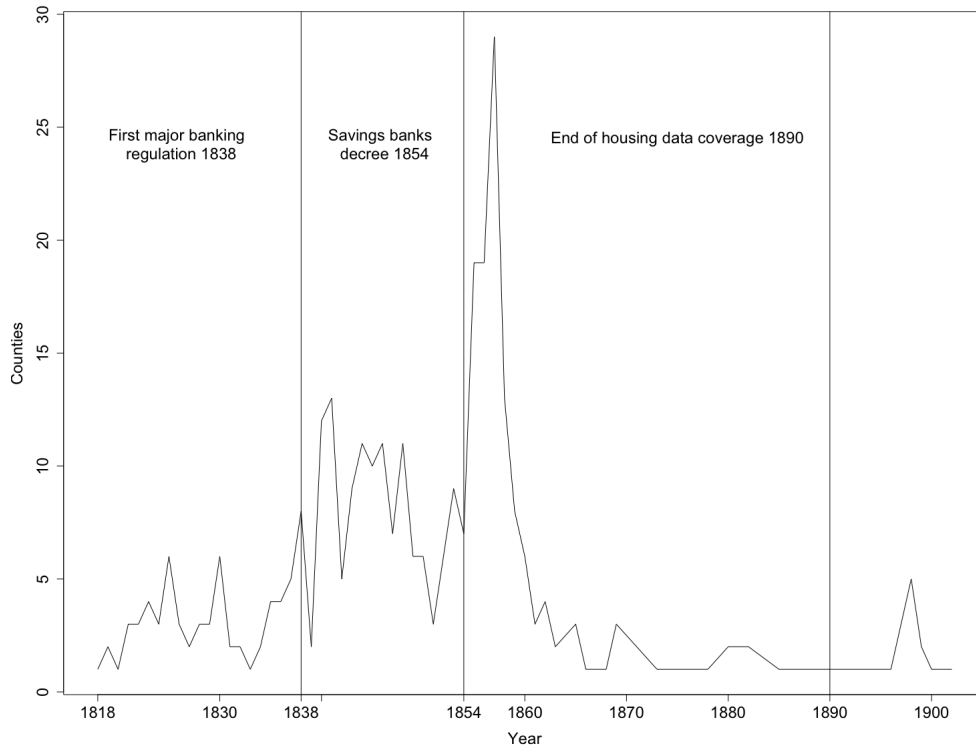


Figure 6: Number of counties which have founded their first savings bank

When trying to measure the effect of financial institutions on economic development in a certain area, endogeneity is a huge concern. Counties which experienced a time of economic prosperity may have more entrepreneurs or companies that demand credit. Additionally, the region's administration may form positive expectations about the future and hence enforce the foundation of banks.

Out of the 335 counties under investigation 197 founded their first savings bank before 1854, 113 between 1854 and 1865 and 25 either later or never. This could have various causes. From an economic perspective, it is likely that the counties that established their first savings bank as a result of the 1854 decree economically lagged behind compared to those that had already done so before. Taking a look at Figure 7 provides insight. It becomes evident that a majority of the first savings banks established before 1854 in their respective counties were located in regions that were more industrialized. This is also reflected in the number of private houses in these counties, as seen in a comparison between Figure 7 and Figure 2. When

Foundation period of a county's first sb

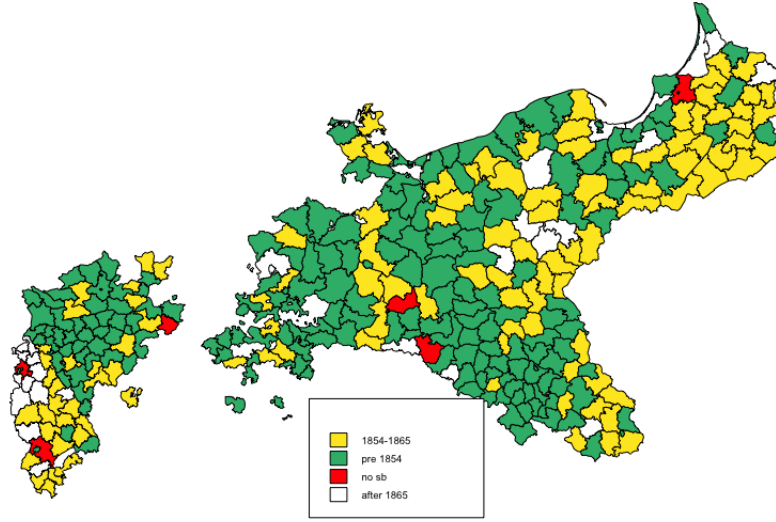


Figure 7: The counties' timing in establishment of their first savings bank.

considering the average number of private houses in both groups, the differences become apparent: the early group, on average, has 5940 houses in 1849, while the other group has an average of 5180.5 houses. Additionally, according to Lehmann and Wahl 2021, cities falling into the former group have a higher population than those that establish their first savings bank between 1854 and 1865. The list of indicators can be further expanded to include differences not only in private residential houses and population but also in the number of factories or the number of steam engines within those factories.²² Summarizing the above, counties that independently established a savings bank before 1854 were, on average, more economically developed than their counterparts that did so only in response to the 1854 law.

Additionally, Lehmann and Wahl 2021 predict the emergence of savings banks prior to 1854 and in the second wave of establishment from 1854 to 1865. They find that the latter banks can not be predicted by structural, economic attributes of

²²Data on these variables can be found here: <https://www.ifo.de/en/ipehd-raw-data-industry>.

the respective counties like city growth for example. Due to their relatively weaker economic position it may have been too risky or too expensive to establish a regional financial intermediary that was secured by the municipality. Without the governmental pressure and support they may not have created a regional financial intermediary out of themselves at that point in time. This may be due to a combination of lacking funds, weak demand and bad economic prospects.

In conclusion, it can be observed that the counties that establish their first savings bank after 1854 share a common characteristic, namely their relative economic lag compared to the group that establishes a branch earlier. This, combined with the findings of Lehmann and Wahl [2021](#), which argue against any general structural factors leading to belonging to the late group, suggests that the 1854 law and the associated requirement to establish a savings bank represent an exogenous shock to the late group. Therefore, I will have a special look at these counties in the next section in which I will quantitatively estimate the effect of savings banks on the development of private housing.

4 Estimation results

To estimate the effect of savings banks on private housing in Prussia I use a fixed effects OLS estimation. I estimate two regression equations: the average yearly growth rate of private houses (labeled as $growth.houses_{it}$) in a county on the number of savings banks in the county at time t ($SBtotal_{it}$, equation [3](#)) and on the time that has passed since the establishment of the county's first bank ($SBsince_{it}$, equation

4). The dependent variable is computed in equation 2.

$$growth.houses_{it} = \frac{houses_{t+1}^i - houses_t^i}{houses_t^i} * \frac{1}{(year_{t+1}) - year_t} \quad (2)$$

$$growth.houses_{it} = \beta_1 SBtotal_{it} + \gamma_i + \delta_t \quad (3)$$

$$growth.houses_{it} = \beta_2 SBsince_{it} + \gamma_i + \delta_t \quad (4)$$

The total number of savings banks which are active in a region captures the degree of financial access of the lower and middle classes within the respective county. Especially in the 19th century a saver who wanted to open an account or deposit additional money in the bank had to walk to the counter, carrying his or her specie money with them. It was mentioned above that county size was designed in such a way that one could reach the administrative center, usually the major city in the county, within one day. Therefore, the mere presence of a bank by far didn't mean accessibility for all inhabitants of the county. Additionally, the savings banks opening times were quite limited, in many cases only two days a month or even less (Guinnane 2002). I argue that the availability of savings banks for a county's population and thus its possible effect on the local economy depended highly on the number of banks which were doing business in a certain region.

In 1849 978 cities held city rights in Prussia which equals to about on average 3 cities per county (Hornung 2015) and a majority - 459 - of the cities (also including small, rural towns) which were investigated established a savings bank between 1837 and 1871, 34 even more than one (Lehmann and Wahl 2021). That yields a minimum of $(459 + 34)/335 = 1.47$ urban savings banks per county between 1837 and 1871. Taking into account the full time horizon until 1890 and not only the urban banks, the average number of banks per county is depicted in Table 4. It can be observed that the urban branches are not the full story. Clearly, all of these banks made business not only with customers of their very neighbourhood but also with the government and businesses which were active in the whole county (Proet-

Table 4: Average savings banks per county per year

Year	Savings Banks
1849	0.67
1864	1.56
1867	1.70
1871	1.81
1875	1.92
1880	2.12
1885	2.43
1890	2.67

tel 2013). Consequently, by focusing solely on urban savings banks, a significant part of the effect might be overlooked. Furthermore, it suggests that one may be measuring the influence of savings banks that are not located within the city but rather outside of it. I assume that a higher quantity of banks per county implies more pooled savings, more credit, better accessibility and hence a stronger effect on economic development. This effect shall be captured by the $SBtotal_{it}$ variable.

The variable $SBsince_{it}$ shall reflect on the fact that it might take time for a savings bank to develop an effect. Inhabitants have to become aware of new opportunities, they have to build trust and the construction sector is a very time-costly industry. To control for unobserved heterogeneity between the counties and year-dependent shocks I am using county and year fixed effects γ_i and δ_t , respectively. In addition, it has to be mentioned that standard errors are clustered by county. Table 5 depicts the variables which are used.

Table 5: Variables used in regression and their descriptive statistics

Variable	N	Mean	Std.deviation	Min	Max
$growth.houses_{it}$ (%)	2,345	0.672	1.527	-12.566	19.787
$SBtotal_{it}$	2,345	1.745	1.812	0	19
$SBsince_{it}$	2,345	21.994	15.681	0	67

First, I run 6 regressions, twice for three groups of counties. The county groups

are separated with respect to the founding dates of their first savings bank. Group (A) contains all 335 counties, (B) consists of those that founded their first savings bank in the first major wave between 1838 and 1853 ($n = 137$), (C) contains those counties that founded their first savings bank in the course of the decree of 1854 up until 1865 ($n=121$). All of the groups contain eight counties that haven't formed a savings bank at all. Note that the number of counties and hence observations of (B) and (C) do not add up to 335 and 2345, respectively. This is due to the fact that some counties either form their first savings bank before 1838 or after 1865.²³ Results are depicted in Table 6.

Groups (A) and (B) exhibit a non-significant point estimate for the $SBtotal_{it}$ variable (columns (1) and (2)). This might be due to issues of endogeneity by reverse causality as was explained above. Additionally, it might have other root causes, e.g. that the relationship between the dependent and independent variable is not linear and wears off over time. This may also be the reason for the negative sign on the estimator for the group that establishes its first savings bank between 1838 and 1853. In contrast to the study by Lehmann and Wahl 2021, which has a 12-year time horizon and only considers cities, most of which have only one bank, the present estimation is based on over 40 years at the county level. This means that many counties establish a significantly higher number of savings banks over the much longer time period, resulting in a different relationship between the independent and dependent variables, which may not be strictly linear leading to counter-intuitive estimators. Nevertheless, for the group for which I can argue in favor of a higher degree of exogeneity in the savings bank treatment, the estimator is statistically significant at the 5% level (column (3)). This is the key result of the present calculations. Here the results suggest a yearly growth in private housing of 0.1563 percentage points per additional savings bank in the county. Despite being fairly low, the ef-

²³The foundation of the first savings bank dates back to 1818, the latest to 1902. In total, 85 counties found their first savings bank prior to 1838 or post 1854, 8 do not found a bank at all. Consequently, $137+121+85 = 343$. As we double counted the non-founding counties (they are included in all groups) I subtract them once leaving us with $343-8=335$ counties which represents the full data set. Multiplying all values by 7 yields the same results for the panel data set.

fect should not be underestimated when considering the development in the long run. Assuming the average number of 5180 houses in a county in 1849, we have $(1.001563^{41} * 5180) - 5180 = 343$ more houses predicted, by having one additional savings bank alone within 41 years. Therefore, I can conclude that savings banks did have an effect on local economies, given that these are more backward and less industrialized. This is also intuitive when remembering that it was part of the savings banks' business model to invest in local SMEs which accounted for a major share of regional economies in the absence of heavy industry.

For all groups the estimated coefficient of the $SBsince_{it}$ variable which captures the time that has passed since the foundation of the first savings bank is non-significant. This might be due to a trend in the housing data which affects all counties the same and has nothing to do with savings banks. Taking a look back at Figure 1 it can be seen that the overall speed of growth declines over time. When looking at the growth rate in the different years this is also reflected quantitatively, e.g. from 1849 to 1864 average growth rates amounted to 0.71%, steadily increasing up to 1.41% until 1871, followed by a sharp drop to 0.2% in 1875.²⁴ These overall, temporal effects are captured by the year fixed effects.

²⁴For the distribution of the $growth.houses_{it}$ variable in each year, see Appendix Figures 9 - 15

Table 6: Private housing and savings banks: OLS fixed effects regression I. Assuming a linear relationship.

Dependent Variable:		Average yearly growth rate of private houses in %				
Model:	(1)	(2)	(3)	(4)	(5)	(6)
	All counties	Counties found- ing their first savings bank between 1838 and 1853	Counties found- ing their first savings bank between 1854 and 1865	All counties	Counties found- ing their first savings bank between 1838 and 1853	Counties found- ing their first savings bank between 1854 and 1865
<i>Variables</i>						
No. of sb in county	0.0271 (0.0333)	-0.0041 (0.0406)	0.1770** (0.0717)			
Time since first sb				0.0120 (0.0086)	0.0272 (0.0216)	0.0218 (0.0280)
<i>Fixed-effects</i>						
county	Yes	Yes	Yes	Yes	Yes	Yes
year	Yes	Yes	Yes	Yes	Yes	Yes
<i>Fit statistics</i>						
Observations	2,345	959	847	2,345	959	847
R ²	0.20606	0.21453	0.30227	0.20650	0.21661	0.30064
Within R ²	0.00018	6.48×10^{-6}	0.00524	0.00073	0.00266	0.00291

Clustered (county) standard-errors in parentheses

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

However, the question still remains: why doesn't the relationship as displayed in Table 6 apply to regions that are considered to be more economically advanced? The effect might be weaker, but it is puzzling and clearly contradicts theory that there is no impact at all and requires further investigation. What sets apart the counties that establish savings banks earlier from those that do so later, even though the latter are more economically progressive? One possible explanation can be found in the development of these counties' regional financial markets: they tend to have a significantly higher number of branches compared to their counterparts. Figure 8 shows this relationship. The plot displays the distribution of the $SBtotal_{it}$ variable in 1890, showing that the counties that found their first savings bank between 1838 and 1853 overall establish distinctively more branches of savings banks than those which do so between 1854 and 1865.

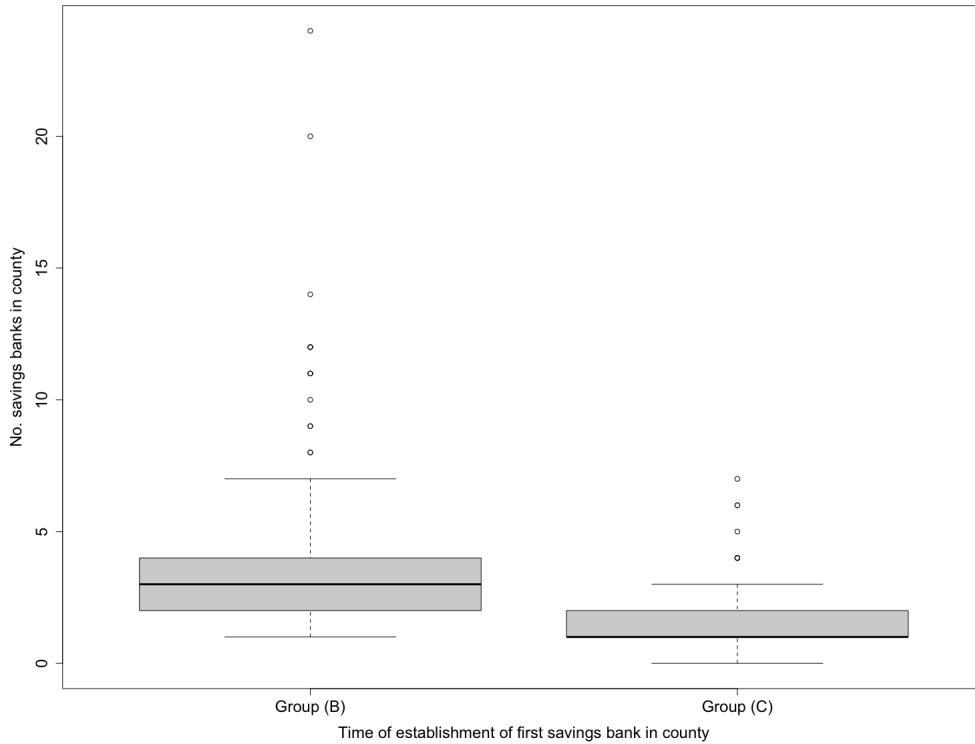


Figure 8: Distribution of $SBtotal_{it}$ for $t = 1890$

In economics, it is common to assume non-linear relationships like concave functions. For example when it comes to the law of diminishing returns or the concept of

marginal utility, every additional unit of input creates less output than the unit deployed before. It is economically reasonable to assume that this holds also true for the effect of credit availability on economic development. Therefore, I run another regression, assuming a quadratic relationship between savings banks and private housing for all three groups and estimated equation (5), using an OLS fixed effect regression.

$$growth.houses_{it} = \beta_1 SBtotal_{it} + \beta_2 SBtotal_{it}^2 + \gamma_i + \delta_t \quad (5)$$

The results of the regression are depicted in Table 7. It shows that the relationship between savings bank availability and private housing wears off with increasing availability of savings banks in a county. Both estimators that refer to the two variables that reflect bank-quantity are statistically significant at 1%-level for all counties and the group of counties that founds their first savings bank between 1838 and 1853 with β_1 being positive and β_2 negative (columns (1) and (2)). Now, we cannot independently interpret a change in the number of savings banks, but have to look at both estimators. In the group that contains all counties (column (1)) the establishment of a county's first savings bank would imply an increase in yearly housing growth of 0.2160 percentage points with every additional bank granting 0.0168 percentage points less than the one before. Interestingly, the effect seems to diminish quite faster in the group that establishes their first savings bank between 1838 and 1854 as compared to all counties. For the group that found their first savings bank in response to the decree of 1854 the quadratic relationship seems not to hold as the estimators are statistically insignificant. This could be the case because these counties have not (yet) entered the stage of the curve which would coincide with a weakening of the effect. In 1890, only two out of 113 counties, have even more than five banks established (Figure 8, taking into account all counties the marginal effect equals to zero after roughly 7 banks are established.).

Table 7: Private housing and savings banks: OLS fixed effects regression II. Assuming a quadratic relationship.

Dependent Variable:	Average yearly growth rate of private houses in %		
Model:	(1)	(2)	(3)
	All counties	Counties found- ing their first savings bank between 1838 and 1853	Counties found- ing their first savings bank between 1854 and 1865
<i>Variables</i>			
No. of sb in county	0.2160*** (0.0508)	0.2402*** (0.0716)	-0.0188 (0.2351)
No. of sb in county ²	-0.0168*** (0.0039)	-0.0200*** (0.0056)	0.0374 (0.0363)
<i>Fixed-effects</i>			
county	Yes	Yes	Yes
year	Yes	Yes	Yes
<i>Fit statistics</i>			
Observations	2,345	959	847
R ²	0.20934	0.22182	0.30332
Within R ²	0.00431	0.00929	0.00673

Clustered (county) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

When taking the derivative of equation (5) w.r.t. $SBtotal_{it}$ the statistical turning point, i.e. when the marginal effect equals to zero, of the relationship between housing growth and savings bank availability can be determined.

$$\frac{\partial growth.houses_{it}}{\partial_{it}} = \beta_1 + 2\beta_2 SBtotal_{it} = 0 \quad (6)$$

$$-\frac{\beta_1}{2\beta_2} = SBtotal_{it}^* \quad (7)$$

Plugging in the estimated values of the coefficients yields $SBtotal_{it}^* = \frac{0.2160}{0.0336} = 6.43$.²⁵

In other words, the effect of savings banks availability on private housing peaks at 6.43 banks in a county. From that point onward the effect starts to diminish. This may be because at a certain point the demand for mortgage credit is saturated and

²⁵Considering the counties in column (2), the turning point is reached at 6 banks.

additional supply is not needed. Or it could be that most of a county's inhabitants already have saving accounts with a bank.

To check for the behaviour before the positive effect of savings bank availability on private housing starts to diminish I run another regression, assuming a linear relationship for all groups of counties, but before an optimal amount of savings bank branches is reached. Therefore, I consider only these observations where an additional savings bank still would imply a positive marginal effect on housing growth. I.e. I allow for observations with a maximum of 7 banks for the group that consists of all counties (column (1) and (4)), a maximum of 6 banks for the group that establishes their first savings bank between 1838 and 1853 (column (2) and (5)) and allowing all observations for the remaining group, founding their first savings bank in response to the 1854 decree (column (3) and (6)). The results are depicted in Table 8.²⁶ To some extent, the availability of savings banks and the average annual growth rates of private residential properties in a county appear to exhibit a positive linear relationship until a certain level of saturation is reached. In all groups, the estimated coefficient for $SBtotal_{it}$ is statistically significant at the 1% or 5% level. It is also notable that the magnitudes of the beta estimates are fairly close to each other. Only in the model that includes all counties, the estimate is slightly lower at 0.1398 percentage points compared to 0.1744 percentage points (B) and 0.1770 percentage points (C). Still the estimators referring to the time that has passed since the first savings bank was founded is non-significant which may have the same root causes as described in regard to the regression Tables 6 and 7.

²⁶Note that observations from group (B) and (C) do not add up to 2299. The difference has two root causes. First, some counties found a savings bank either prior to 1838 or post 1854, see 23 on that. Second, the amount of observations which I exclude differ non-uniformly between the groups. For example from the group that consists of all counties (column 1 and 4) I deduct 46 observations while I subtract 47 from the group of counties which founded their first savings bank in the time period of 1838 to 1853 (column 2 and 5).

Table 8: Private housing and savings banks: OLS fixed effects regression III. Allowing for observations where the marginal effect of bank availability is larger than zero.

Dependent Variable: Model:	Average yearly growth rate of private houses in %					
	(1) All counties	(2) Counties found- ing their first savings bank between 1838 and 1853	(3) Counties found- ing their first savings bank between 1854 and 1865	(4) All counties	(5) Counties found- ing their first savings bank between 1838 and 1853	(6) Counties found- ing their first savings bank between 1854 and 1865
<i>Variables</i>						
No. of sb in county	0.1398*** (0.0345)	0.1744*** (0.0461)	0.1770** (0.0717)			
Time since first sb				0.0131 (0.0086)	0.0293 (0.0215)	0.0218 (0.0280)
<i>Fixed-effects</i>						
county	Yes	Yes	Yes	Yes	Yes	Yes
year	Yes	Yes	Yes	Yes	Yes	Yes
<i>Fit statistics</i>						
Observations	2,299	912	847	2,299	912	847
R ²	0.19002	0.17827	0.30227	0.18841	0.17634	0.30064
Within R ²	0.00288	0.00574	0.00524	0.00089	0.00341	0.00291

Clustered (county) standard-errors in parentheses

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

5 Conclusion

Up until now, all studies quantifying the relationship between economic development and the availability of financial services through savings banks have focused either on macroeconomic aggregates or on urban areas. This current study is the first to conduct an analysis at the county level. Prussian savings banks were clearly restricted by legislation to operate in these areas, making them the most suitable unit of analysis for this study. In general, the results of this study align with the implications of the theory and other previous empirical works, such as Burhop 2006 or Lehmann and Wahl 2021, and have successfully established a statistically significant relationship between the availability of savings banks in a county and the annual growth of private residential properties within it. However, their findings differ to some extent, mainly due to the longer time horizon considered in this study. Here, it was observed that the relationship between the dependent and independent variables changes over the observation period where the number of active savings banks in a particular region plays an important role. If there are fewer banks, the marginal effect of an additional bank is greater, whereas if there are more banks, the effect becomes smaller. This extends the analysis which was done by Lehmann and Wahl 2021 as it shows that it not only matters if but how many banks are available in a specific county. In general, the issue of causality remains largely unresolved in the works of Lehmann and Wahl 2021, Burhop 2006, and the present study. While exploiting the 1854 law provides a degree of exogeneity in the treatment of savings banks for a specific group of counties, this doesn't hold true for the majority of communities. As a result, the description primarily relies on a purely statistical correlation. Moreover, a fundamental challenge of the county-based approach is the difficulty in clearly delineating the effects of individual savings banks due to frequent changes in administrative boundaries. Similar difficulties are encountered by Lehmann and Wahl 2021, who cannot definitively attribute the effects they measure to urban savings banks. This is due to the widespread presence of savings banks at

the county level, making it highly probable that surrounding areas also engaged in savings bank activities that influenced the urban economy.

However, the results of this empirical study point towards a set of questions that go beyond the distinction between correlation and causality. It is noteworthy that the effects manifest differently in various groups of counties. Regions that initiate the establishment of savings banks through internal economic dynamics tend to establish a significantly higher number of banks compared to those that are brought about by state intervention. Consequently, these two groups exhibit different dynamics of bank availability and housing growth. While the relationship in the former group can be described by a quadratic, concave function, the latter group appears to have a linear relationship. These results raise interesting follow-up questions that should be addressed in future research. For example, do the differences in relationships between the two groups simply stem from the fact that the latter group had fewer savings banks, or can implications be derived from the economic structure of a region regarding a specific interaction between the real sector and the financial sector?

What can we learn from the 1854 law for economic policy today? First, it serves as an example of effective, targeted policy measures: economically weaker regions were strengthened through the establishment of a savings bank. On the other hand, this approach did not set these counties on a path that would have ignited their own dynamics in the financial sector. Despite the positive effects, these regions established significantly fewer branches compared to others. The resulting issue addresses a similar aspect as the previous question. How important is the economic structure of a region when it comes to the effectiveness of certain types of financial services? In my opinion, future research in this field should focus on such questions. This study emphasizes that in the interplay between the real and financial sectors, there cannot be a "one size fits all" solution.

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Appendix

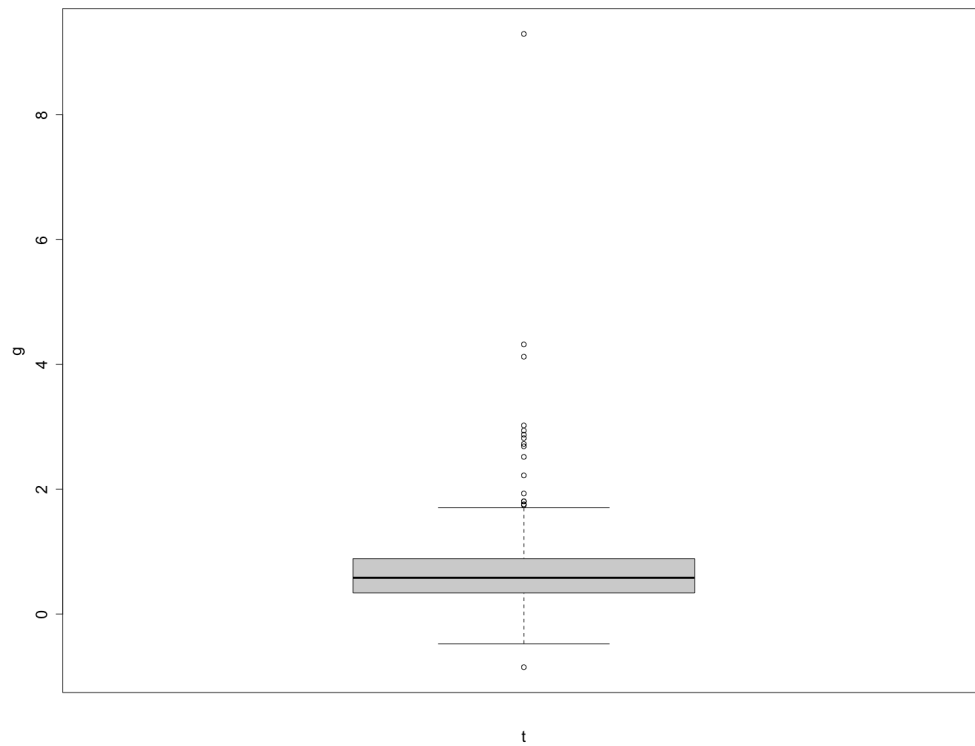


Figure 9: Distribution of average yearly housing growth for $t = 1849$

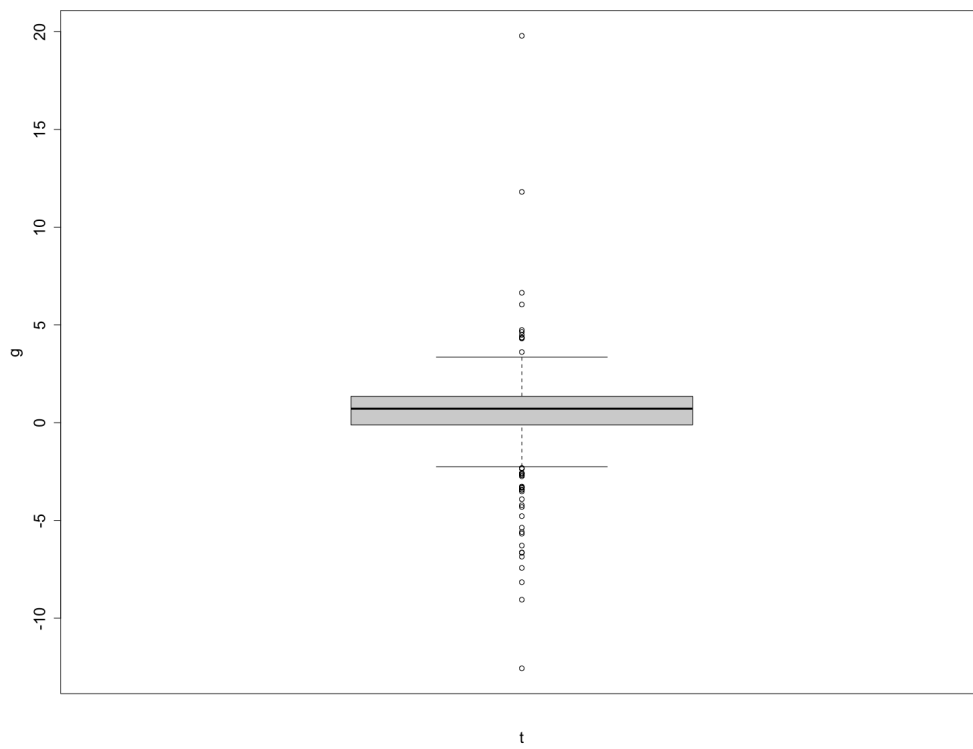


Figure 10: Distribution of average yearly housing growth for $t = 1864$

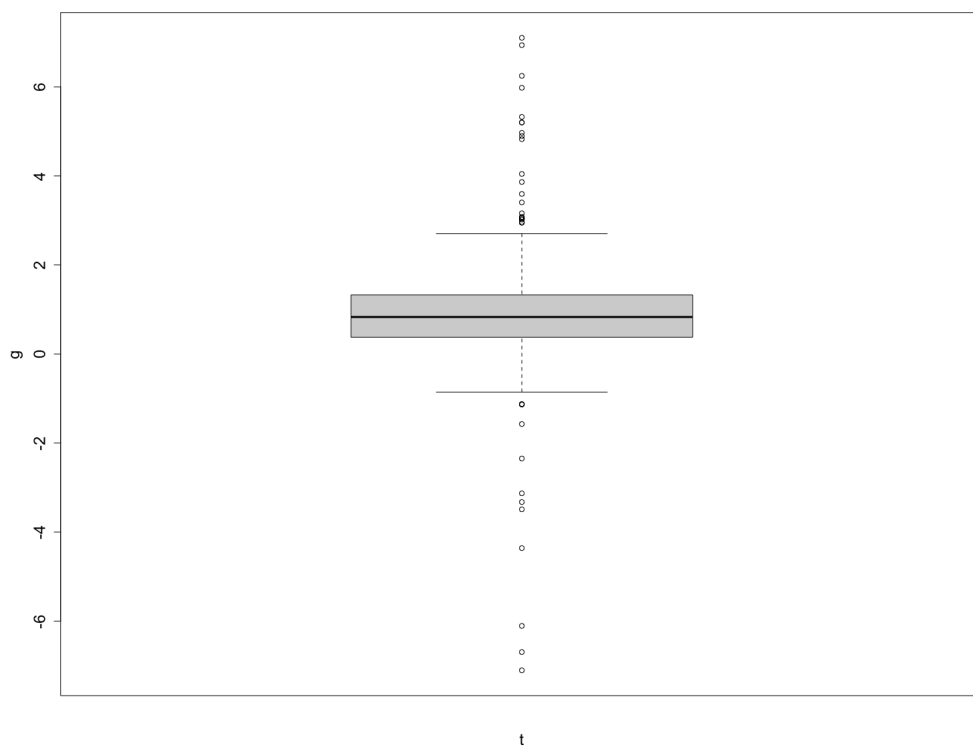


Figure 11: Distribution of average yearly housing growth for $t = 1867$

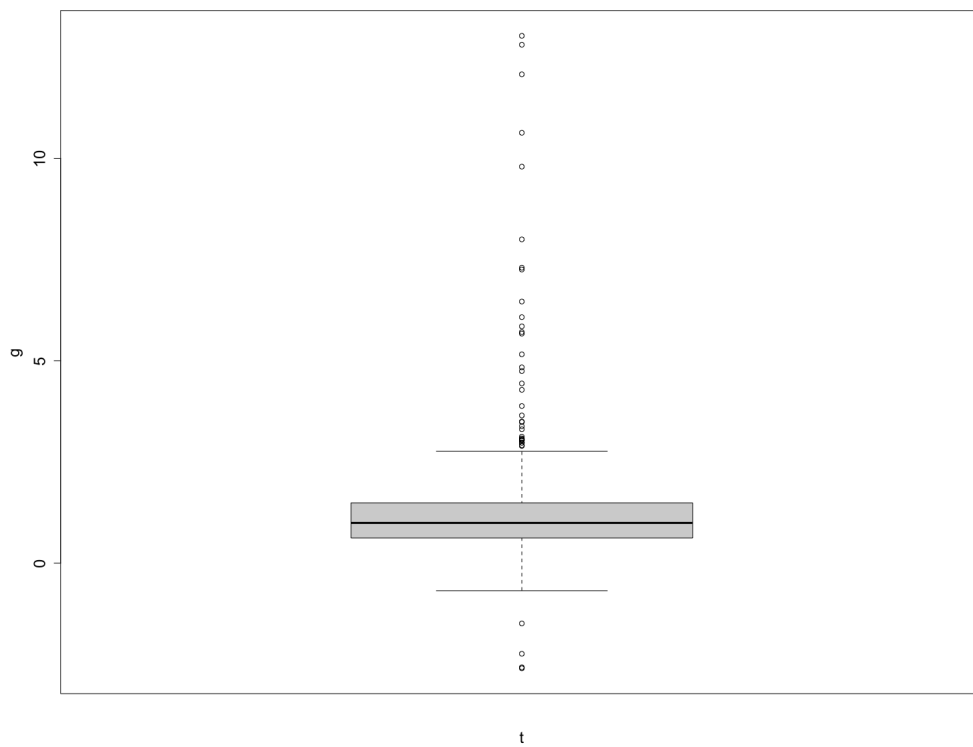


Figure 12: Distribution of average yearly housing growth for $t = 1871$

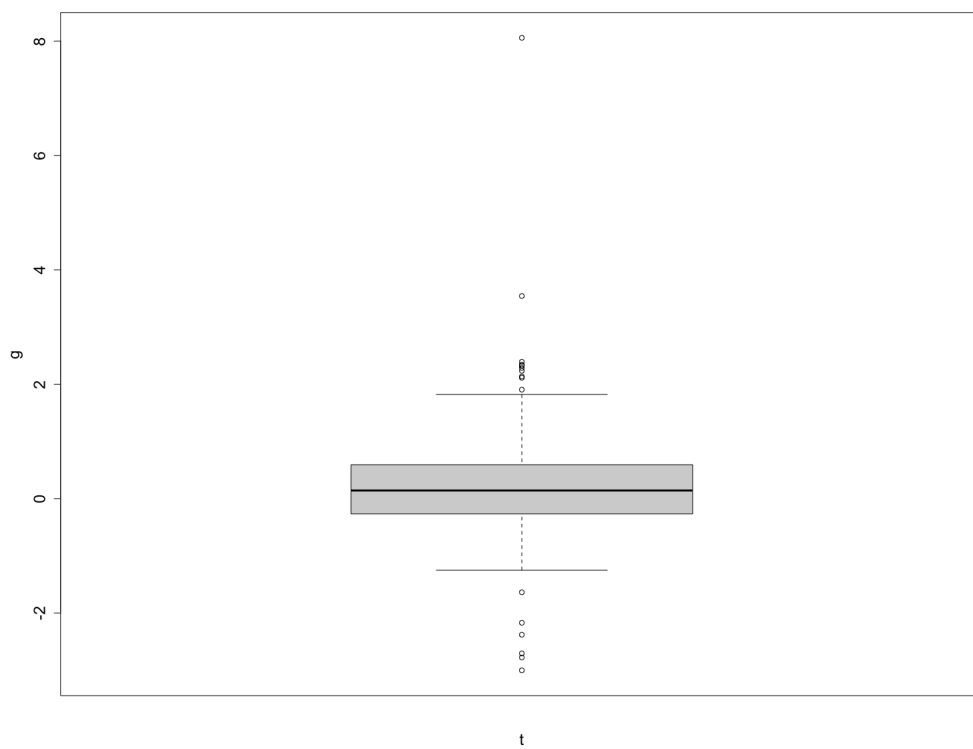


Figure 13: Distribution of average yearly housing growth for $t = 1875$

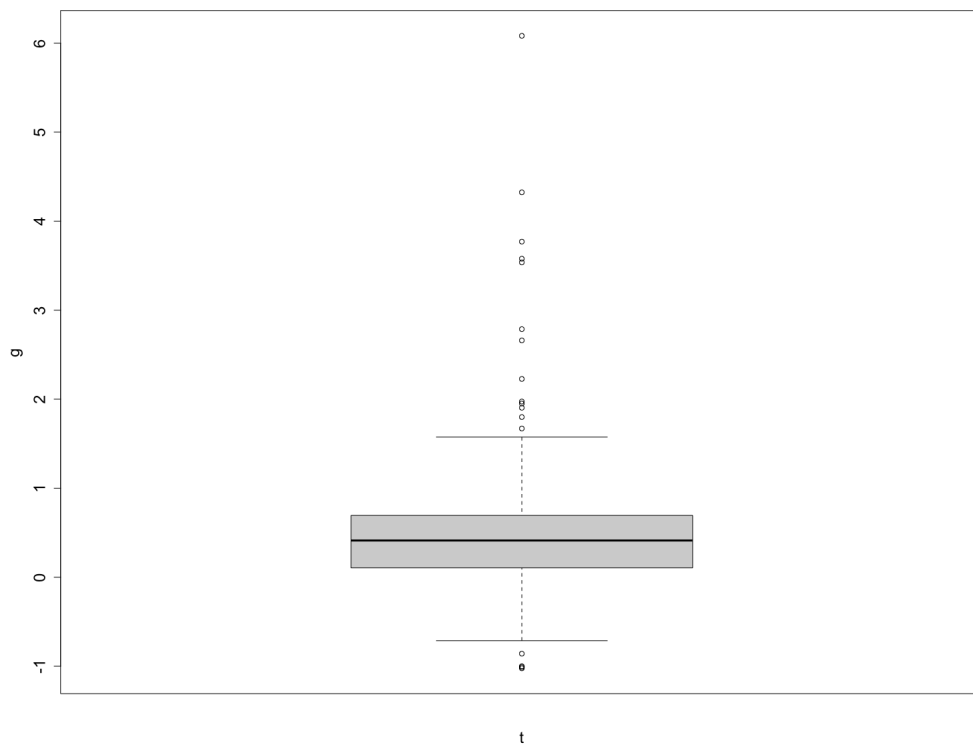


Figure 14: Distribution of average yearly housing growth for $t = 1880$

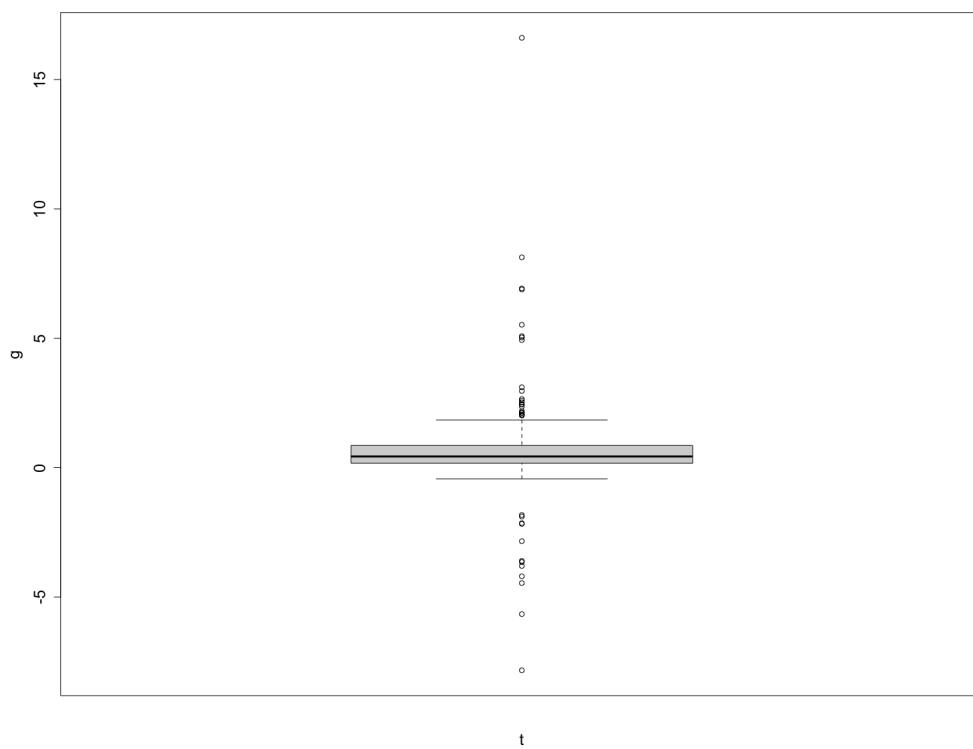


Figure 15: Distribution of average yearly housing growth for $t = 1885$