

*Financial Development and Its
Effects on the Structure of Banking
Systems, Economic Growth, and
Inequality*

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List of Abbreviations

ATM	Automated Teller Machine
CSH	Contractual Saving for Housing
DALAHO	Data Laboratory Hohenheim
DCFS	Domestic credit by the Financial Sector
DCPS	Domestic Credit to the Private Sector
DiD/ Diff-in-Diff	Difference-in-Difference
EU	European Union
FE	Fixed Effects
Freq.	Frequency
GDP	Gross Domestic Product
GMM	General Method of Moments
H1	Hypothesis 1
H2	Hypothesis 2
H3	Hypothesis 3
KPD	Kommunistische Partei Deutschland
Max.	Maximum
Min.	Minimum
NUTS	Nomenclature des unités territoriales statistiques
NSDAP	Nationalsozialistische Deutsche Arbeiterpartei
Obs.	Observations
OLS	Ordinary Least Squares
p.c.	Per Capita
RM	Reichsmark
SBL	Single Banking License
SME	Small and medium enterprises
St. dev.	Standard deviation
s.e.	Standard error
SPD	Sozialdemokratische Partei Deutschland
U.S./ USA	United States of America

List of Symbols

Chapter B

$Y_{i,t}$	dependent variable, thus, either economic growth or wealth measured by the logarithm of GDP per capita, income inequality measured by the Gini coefficient, income shares of the top and bottom 20%, or the unemployment rate
i	different member states of the European Union
t	time periods of the econometric analysis
$SBL_{i,t}$	dummy variable which is equal to one if the country joined the European Single Market/ Single Banking License and zero otherwise
β, γ	regression coefficients
$\mathbf{X}_{i,t}$	vector of control variables, including secondary school enrollment, trade openness, final government consumption, and domestic credit to the private sector
σ_i	country-fixed effects
τ_t	year-fixed effects
$u_{i,t}$	idiosyncratic error term

Chapter C

$\ln GDP_{c,t}$	dependent variable of the growth rate of real GDP per capita computed with logarithms for each country; alternatively the control variable for economic development
$GINI_{c,t}$	dependent variable of the Gini coefficient or income shares; alternatively the control variable for income inequality
c	indicator for each country in the sample
t	time periods of the econometric analysis
$\beta_{1,\dots,n}$	regression coefficients
$\mathbf{FINANCE}_{c,t}$	vector of control variables for financial development, stock market development, or financial liberalization
$TRADE_{c,t}$	control variable for trade openness
$INF_{c,t}$	control variable for inflation
$GOV_{c,t}$	control variable for government consumption
$SCHOOL_{c,t}$	control variable for secondary school enrollment
$\epsilon_{c,t}$	idiosyncratic error term

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A General Introduction

In the discussion of the determinants of economic growth and income inequality, the most cited factors are globalization (e.g., in Barro (1996) or through trade as predicted in the theorem by Stolper & Samuelson (1941)), demography (Dennison & Ogilvie 2016), technological progress (Galor & Tsiddon 1997, Greenwood & Seshadri 2005), or educational attainment (Galor & Zeira 1993, Galor & Moav 2004). Meanwhile, the role of financial development, integration and liberalization is often overlooked. However, banks are responsible for forming an efficient capital allocation and to distribute capital across an economy to entrepreneurs and economic agents so that they can fulfill their business ideas and obtain efficient investments.

Banks perform several functions that in summary constitute financial development. Through lot size transformation, banks pool small and short-term deposits to grant them later on as long-term loans (Sirri & Tufano 1995). Entrepreneurs and companies with a small endowment of initial wealth can then improve their financing situation through investments by banks (Hellwig 2009). Through portfolio diversification, banks limit their risk on an institutional level and, thus, provide deposits that are generally seen as safe investments. By acting as financial intermediaries, banks bundle deposits and take up the task of monitoring individual borrowers and firms so that not every single investor has to go through the whole process (Jensen & Murphy 1990, Boyd & Prescott 1986, An et al. 2008, Acemoglu & Zilibotti 1997). In an economy without banks, companies would have to hold liquidity to cope with stochastic fluctuations in their financing needs and households would have to hold liquidity to smooth their consumption and savings behavior. Furthermore, every investor would have to set up and renegotiate financial contracts. Financial intermediaries improve the acquisition of information about firms and other borrows and provide financial contracts that increase the confidence of creditors about the repayment of their investments (Levine 2005). Consequently, banks perform the tasks of delegated monitors (Diamond 1984, 1996), delegated contractors (Burghof 2000), and liquidity providers (Diamond & Dybvig 1983) to reduce market frictions (Bodie & Merton 1998) and to produce information and to offer an efficient capital allocation in an economy (Boyd & Prescott 1986, Boot et al. 1993, Holmström & Tirole 1993, Galor & Zeira 1993, Levine 2005).

This thesis investigates the access to financial services then affects the capital formation of households and through that economic growth. In a next step, higher economic growth then raises the wealth and well-being of nations and possibly helps low-income countries to improve their income distribution and reduce the distance to high-income countries ultimately closing the income gap (Ranjbar & Rassekh 2017).

The literature on relationship lending and regional banking systems stresses further how well-developed financial systems widen the access to financial services and through

that improve the credit allocation. Stein (2002) proves that a decentralized banking system is more suited to the utilization of soft information. While large banks simply rely on hard and quantifiable information in their lending decisions, small banks are closer to their customers. The clerk at a local savings bank, for example, also includes soft factors in his lending decision and has the capability to evaluate whether a borrower will make repayment when seeing him face to face. In this context, small and geographically close banks are especially important for small and medium sized firms (Alessandrini et al. 2009) while large banks tend to reduce loan volumes for firms with an opaque informational situation (Berger et al. 2005). Close banking relationships develop over long periods of time during which the screening capabilities of banks improve (Boot & Thakor 2000, Elsas 2005) and transaction costs are further reduced (Petersen & Rajan 1994, Elsas & Krahnert 1998, Cotugno et al. 2013).

The model by Hakenes et al. (2015) gives an additional rationale for regional public banks. The authors predict a capital drain from under-developed or rural areas to richer regions for a setting with only big banks that solely focus on hard information. This capital drain reduces the access to finance in this poorer regions even more and harms the economic opportunities of households and companies in the less developed regions. However, as I show in the later parts of this dissertation, the poor disproportionately benefit from financial development and access, at least for the short run. Nevertheless, if the necessary financial institutions for the utilization of financial development are missing in less-developed regions, people will miss out on a catching up process to richer regions.

The crucial point for economic development is also whether an economy has a well-functioning financial system at all. Finance shapes the gap between rich and poor and how these income differences persist across generations (Demirgüç-Kunt & Levine 2009). This either works through the extensive margin and an increased availability of financial services to people who did not have these opportunities due to financial constraints. The other way is the intensive margin, in which the already rich disproportionately reap the profits from enhanced financial services, since they already have access to them and know how to work the channels of financial development. This would widen inequality and reduce the equality of opportunity (Greenwood & Jovanovic 1990, Demirgüç-Kunt & Levine 2009).

Besides the investments into entrepreneurial ideas and businesses, the efficient formation of human capital is an additional important channel through which financial development improves the growth prospects of economic agents. The model by Galor & Zeira (1993) shows, that self-financed investment in education and human capital is only feasible for richer households with an initial endowment of wealth. Financial market frictions would then keep the poor disproportionately more from accumulating education (Hanushek & Woessmann 2012) and, thus, from obtaining higher paid jobs and improving their income prospects. However, when financial access improves, even the poor can bor-

row and invest in human capital, what increases growth and reduces income inequality. The initial distribution of wealth, therefore, plays a crucial role for the development of the economy but financial integration and liberalization can reduce the impacts of differences in the inter-generational wealth endowments of households.

Galor & Moav (2004) consider both human and physical capital and show how income inequality changes over the process of financial development. In the early stages, inequality positively affects growth, since resources are channeled towards individuals with a higher marginal propensity to save which increases with income. During this stage, growth-enhancing financial development will also boost inequality. Later on, wide spread human capital formation becomes essential for growth. The poor would like to borrow to finance their education and improve their future incomes but are restricted by borrowing constraints. Following from that, investment opportunities become a function of dynastic assets and parental wealth, what in turn leads to persistent inequality (McKenzie & Woodruff 2006, Townsend & Ueda 2006, Piketty 2000).

As the literature shows, financial development is a significant factor in the determination of economic growth and inequality. An ideal setting to investigate the effects of financial development and integration on macroeconomic factors are natural experiments such as the bank branch deregulation in the 1970s in the U.S. (e.g., in Beck et al. (2010) or Jayaratne & Strahan (1996)) or foreign bank entry after the Indian balance of payments crisis in the 1990 (Ang 2010).

An example of large scale financial integration, which so far was overlooked, is the formation of the European Union and the following introduction of the Single European Market. In addition to a harmonized trading zone and labor market, the European integration also saw the establishment of a Single Banking License or Banking Passport in 1993. This enabled European banks to freely branch into neighboring countries and do their business without any limitations or restrictions. **Chapter B** of this thesis will, therefore, present my paper "*One Market to Rule Them All - How Financial Integration Influenced Inequality in the European Union*" which is also accepted for publication at *CESifo Economic Studies*. In this paper, my co-author *Hans-Peter Burghof* and I¹ investigate the effects of the Single Banking License and the accompanying massive change in competition on Europe's financial markets on economic growth and income inequality by means of the different entry dates of member states into the European union.

Our study shows that by entering the European Union and, thus, the single European financial market, countries can significantly increase economic growth. We find an increase of roughly 41% in the logarithm of GDP per capita and, thus, economic wealth of EU

¹I am the main corresponding author of this paper. My contribution to this paper was the development of the initial research idea, the literature review and development of the theoretical foundations, the data collection, preparation, and management, the design of the empirical analysis, and the interpretation of the results. Furthermore, I co-wrote every chapter and manage the submission process of the paper to scientific journals and conferences.

member states across the whole time span and process of financial integration. While the results for economic growth are clear cut, our analysis for the effects of European financial integration on income inequality measured by the Gini coefficient are ambiguous. Countries with an inequality index already below the average can further reduce their Gini coefficient. Other samples also show inequality reducing but statistically insignificant signs.

To get an even deeper analysis of the finance-inequality-nexus in Europe, we also include other inequality measures as dependent variables such as the unemployment rate to capture effects on the labor market and the top and bottom 20% income shares to circumvent the insensitivity of the Gini coefficient of the tails of the income distribution. We show that financial integration reduces unemployment in high inequality countries, while countries with low inequality see rising unemployment. The top and bottom income shares further prove the positive effect of European financial integration on incomes in the member states. Bottom incomes go up with financial integration while top incomes are reduced. Furthermore, these results hold under various specifications and robustness checks and indicate that the European member states move to a common European average with new member states catching up to their peers.

Meanwhile, we make sure that we actually disentangle the effects of financial development from overall EU integration such as increased access to trade or to a wider labor market. With our set of control variables and fixed-effects, we capture the influence of standard determinants of growth and inequality. Furthermore, we run separate regressions for the subset of countries that entered the EU before 1993 which confirm the results of our estimations for the complete sample.

As discussed above, so far the economic analyses of inequality in the literature mostly rests on macroeconomic variables and is often performed for a single country or small samples. However, the literature on relationship lending and decentralized banking systems also shows that increased financial access and development work for a significant part on microeconomic levels and through individual interactions between banks and their borrowers. Well developed and decentralized financial systems that are widely spread across an economy with a high number of bank branches make financial services readily accessible for all economic agents. Furthermore, banks act as delegated monitors and contractors and provide liquidity in such a way that even people without an initial endowment of wealth can overcome financing restrictions.

The pressing question is then whether causality runs from financial sector development to growth and inequality or from the macroeconomy to financial development. In Chapter B the answer to the question of causality was relatively easy, since we could rely on the timing of countries' entries into the EU and the subsequent developments of their economic wealth and inequality. In **Chapter C** and the paper "*The ATM Around the Corner - How Financial Development, Access, and Integration Influence Economic*

Growth and Inequality”, I further argue for the *supply-leading* hypothesis that a more developed financial or banking system influences the growth path of an economy and ultimately inequality. This hypothesis is contrasted by the *demand following* view which states that a growing economy has more demand for output which requires more investments and financial services. I reject this second view in this paper, since the financial systems which serve as explanatory variables in Chapter C were established long before and precede the observations of my dependent variables. Furthermore, in this paper I employ a system GMM estimation to circumvent any additional concerns of reverse causality.

For the analysis in Chapter C, I use a specifically micro-based set of indicators of financial development like the number of bank accounts, branches, and even ATMs. This adds to the understanding on how financial development and integration influences growth and inequality on a really gradual level. The mere physical possibilities of economic agents to use financial services and to interact with banks shows the very ”personal” effects of financial integration for single economic agents. First, I use cross-sectional OLS regressions to capture long-run effects of financial liberalization and integration, before fixed-effects panel regressions complement this for the short- and medium-run. As already mentioned, I employ additional system GMM estimations to support the supply-leading hypothesis of financial development. In contrast to standard Instrumental Variable regressions, where it can be difficult to find suitable instruments, GMM draws the instruments from within the data by using lags of the dependent and other potentially endogenous variables. The lags of financial liberalization variables then predict the dependent variables of economic growth and inequality and, with significant coefficients, we can argue for causality running from finance to economic development.

The results show that financial development and liberalization significantly improve economic growth for a world-wide sample of countries. With regard to income inequality, the short-run dynamics show inequality alleviating effects, while in the long-run, financial development might widen the income gap. As for Chapter B, again especially the results for the top and bottom 20% of the income distribution are most insightful and show that more developed financial systems positively affect lower incomes. Improved access to financing opportunities helps poorer people to achieve entrepreneurial ambitions, to move up in the income distribution, and to overcome financing restrictions.

After the examples of financial integration in the European Union and with micro-based financial services such as ATMs, **Chapter D** then presents results of a more ”exotic” research project. The paper ”*Contractual Saving for Housing as Early Financial Development and Its Clients in Weimar Germany*”, co-authored with Julia Braun, Hans-Peter Burghof, and Daniel Alexander Schmidt², looks at financial development in a his-

²I am the main corresponding author of this paper. My contributions are the development of the initial research question, the literature review and subsumption of the general theory, the management

torical context and for the financial service of *Bausparen*.

Bausparen or contractual saving for housing (CSH) combines characteristics of a savings account and a loan within a savings collective. It quite generally constitutes financial development, since people with limited wealth and income join the collective to overcome financing constraints for larger investments. They jointly pay into a collective pool during the savings phase and accept sub-market interest rates during this phase. When they reach eligibility for the loan phase, they have the right to receive a mortgage loan again at a preferential rate compared to the market. Thus, the concept combines the overcoming of financial constraints with locked-in interest rates and a smoothing of the financial burden over time.

After the end of World War I in 1920s Germany, we then saw a severe shortage of housing in some parts of the Weimar Republic. However, in contrast to the situation after the Second World War, this shortage was not due to direct war damages, but rather to low building rates. Traditional credit institutions such as savings and mortgage banks were not able to serve the demand for new housing financing, as they were suffering from the turmoil of hyperinflation and the devaluation of their deposits. The state reacted with a wide set of policy actions, subsidies, and changes in taxation which were ultimately insufficient to trigger the needed investments (Clingan 2000). Previously introduced measures such as rent control and a high interest rate environment further reduced incentives for private building efforts (Gehlen 2015). As a response to this lack of supply for adequate financing, building societies or *Bausparkassen* that offer their clients a new and special type of financing contract in the form of contractual saving for housing were established.

In this paper in Chapter D, we analyze archival documents of the first, and, for some time, by far most important, *Bausparkasse*, the *Gemeinschaft der Freunde Wüstenrot* (today *Wüstenrot Bausparkasse AG*), to illustrate the progress and distribution of this financial development in the 1920s and 30s across Weimar Germany. We manually digitized over forty ledgers of CSH data on customers which were eligible for the payment of their loan from the *Wirtschaftsarchiv Baden-Württemberg*. The core information for our analysis is the place of residence and the occupation of the clients. With this data, we trace the geographical dispersion of contractual saving for housing and its customers across Germany as well as across occupations and social classes.

The spread of contractual saving for housing started in the South-West of Germany in the states of Württemberg and Baden, as the building society of our data set is located in this region. Nevertheless, CSH almost immediately crossed state lines to many other regions of Weimar Germany. Besides the core market in South-West Germany, these are the state of Hesse, the Free State of Thuringia and other parts of Central Germany, the

and process of data collection and preparation, the descriptive analysis of the data and development of first interpretations and speculative arguments. Furthermore, I co-wrote every chapter and managed the submission process of the paper to scientific journals and conferences.

Prussian provinces along the Rhine, and Northern Germany. Remarkable is the comparatively low number of CSH customers in the Prussian heartland of Brandenburg and East-Prussia, i.e., the historical provinces of Prussia before the expansion of the Prussian state. While the regions with high frequency of CSH customers are more industrialized and dominated by relatively liberal federal governments, Prussia's institutions and the rule of a traditionally more paternalistic monarchy might be factors that slow down the adaptation of new financial developments. At the same time, the rather agricultural and comparatively poor remainder of Prussian society and the Prussian civil servant state could leave less room for private self-reliance and the adaptation of financial innovations.

With regard to social classes, the character of CSH as a form of financial development becomes even more evident. Especially the upper lower and the lower middle class are represented in our sample of CSH customers. We expect financial constraints due to missing inherited wealth and a lack of financing opportunities in these parts of the population that can be overcome by forming a savings collective. The poorest classes were too close to the subsistence level to save in any form while the upper classes, on the contrary, did not necessarily need to go through CSH banks to finance large housing investments. Nevertheless, the upper classes are still relatively strong in our sample of CSH customers. This shows that this financial innovation serviced a demand for housing finance across several social classes that was not satisfied by conventional financial institutions. Thus, this Chapter gives evidence for the aforementioned demand-following hypothesis and completes the overall discussion of financial development in this thesis.

Chapter E will then draw a general conclusion for this paper and the overall discussion of financial development and its effects on economic growth and inequality. I will further add some aspects and scope for further research beyond the three papers presented here and draw some policy implications.

B One Market to Rule Them All - How Financial Integration Influenced Inequality in the European Union

Hans-Peter Burghof* and Marcel Gehrung^{†‡}

Abstract

Financial integration is seen as a major driver of economic growth and wealth. Its effects on income inequality have been analyzed for the bank branch deregulation in the U.S. and foreign bank entry in India. Another prominent example of financial integration and liberalization, so far, has been ignored: the introduction and progression of the European Single Market. By using a difference-in-difference design, we investigate the effects of the Single Banking License introduced in 1993 on economic growth and several inequality measures. This directive abolished any cross-country restrictions on banks in EU member states and allowed them to freely branch into other member states. This constitutes a fundamental change in the competitive environment of financial markets. We show that the European Single Financial Market positively influenced economic growth across a variety of subsamples of EU member states. The effects on income inequality indicate that inequality across states was reduced. Additional regressions with the unemployment rate and top and bottom 20% income shares support this finding and show a reduction of unemployment in previously less developed countries accompanied by an increase in the bottom income shares across all member states.

Keywords: Financial Development, Economic Growth, Income Inequality, European Union

JEL Classifications: D63, E44, G21, O11

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B.1 Introduction

Financial integration through the reduction of bank branching restrictions or the opening up of financial systems has been in the focus of academic research for some time. The most prominent example is the deregulation in the U.S. in the 1970s, which allowed banks to extend their web of branches across state lines (e.g., see Beck et al. (2007) or Beck et al. (2010)). Another well documented example of financial liberalization is the case of India, which had to open up its financial system after the balance of payments crisis in the 1990s to increase competition between banks by reducing entry barriers for foreign banks (e.g., see Gormley (2010)).

An example of large scale financial integration, which so far has not been subject to extensive research, is the formation of the European Union and by that the introduction of the Single European Market. With the newly established banking passport, from 1993 onward, European Banks were free to branch into neighboring countries and do their business without any limitations or restrictions. By means of the entry dates of different countries into the European union, we will investigate the effects of this massive change in competition on financial markets on economic growth and income inequality in the respective member states.

Our results show that by entering the European Union and, thus, the single European financial market, countries can significantly increase economic growth. When measuring the increase in nations' levels of wealth by the logarithm of GDP per capita, we find an increase of roughly 41% across the whole time span and process of financial integration. These results also hold for several subsamples of the data. The results for income inequality measured by the Gini coefficient, on the contrary, are more opaque. While countries with an inequality index already below the average can further reduce their Gini coefficient, other samples also show inequality reducing signs, yet without the necessary statistical significance.

To further investigate the finance-inequality-nexus in Europe, we also include other inequality measures as dependent variables. For the unemployment rate, we show that financial integration reduces unemployment in high inequality countries, while countries with low inequality show increasing unemployment. These figures indicate that the European member states move to a common European average and that new member states can catch up to their peers. By looking at the top and bottom 20% income shares, this result becomes even clearer with a boosting effect of European financial integration for the bottom incomes and a negative effect on top incomes. Furthermore, these results hold under various specifications and robustness checks.

Therefore, our findings complement previous research on financial integration and its effects on economic growth and inequality for a new natural experiment and a different set of countries. While the U.S. was an example for bank branching deregulation within a sin-

gle well-developed country and India gives results for a developing nation, the European Union offers insights into the effects of financial integration across several developed nations. We also find that a more developed and integrated financial system helps economic growth across nations, as previously found by, e.g., King & Levine (1993), Levine (2005), or Jayaratne & Strahan (1996). Regarding the effects on inequality, we offer new insights into financial liberalization that is not characterized by the establishment of single bank branches and openings but by a wholesome change of the competitive environment of a financial market. We go in the same direction as Ang (2010), Gormley (2010), Claessens & Perotti (2007), or Demyanyk et al. (2007), who show that especially bottom incomes benefit from financial development.

Meanwhile, we further disentangle the effects of financial development from overall EU integration such as increased access to trade or to a wider labor market. With our set of control variables and fixed-effects, we capture the influence of standard determinants of growth and inequality. Additionally, we run separate regressions for the subset of countries that entered the EU before 1993 which confirm the results of our estimations for the complete sample.

The paper will proceed as follows: Chapter B.2 gives a brief overview of the financial integration process in the European Union, while Chapter B.3 describes the existing literature regarding financial development and economic growth and inequality and other effects due to changing legislation. Chapter B.4 then presents the data and Chapter B.5 the methodology we use. The results follow in Chapter B.6 with further robustness checks in Chapter B.7. Chapter B.8 will then conclude.

B.2 Financial Integration in the European Union

Starting in the early 1980s, the unification of the European financial market kicked off. With the Single Banking License in 1993 and later the introduction of the European Central Bank in 1998 as well as the Euro as a common currency, the European Monetary Union was further established. The first point on this list, the Single Banking License or “banking passport”, allows banks with their headquarters in any of the 27 member states to open up branches and offer their services in other states of the Union. With progression of the European Single Market and the economic and monetary union, the legislators of the EU tried to provide a level-playing field for all members in the financial system. By reducing entry barriers, the European financial system should become more competitive and more efficient. However, this competition enhancing deregulation also led to a wave of mergers and acquisitions with the number of banks in the EU dropping by 18% between 1997 and 2003 (Casu & Girardone 2006). Additionally, the new regulatory framework of the EU trying to increase stability is forcing banks to merge or exit the market since they cannot comply with the immense regulatory burden needed to do banking business. This

trend is especially pronounced in Germany with its many very small and regional public savings and cooperative banks (Uhde & Heimeshoff 2009, Flögel & Gärtner 2018).

In this context, relationship lending and the utilization of soft information in regionally decentralized and wide-spread banking systems is important. The seminal paper by Stein (2002) proves theoretically that decentralized banking systems are better in utilizing soft information. While larger banks with more hierarchical structures need hard and quantifiable information to adequately judge their borrowers, small banks show a shorter distance to their customers and can deal more easily with an opaque informational situation (Berger et al. 2005). A clerk at small and decentralized banks might very well know most of his customers personally and have a close relationships to them. Credit decisions might then go beyond the hard numbers and the subjective view of the banker about her borrower, and its (personal) creditworthiness plays a larger role (Cole et al. 2004). Agarwal & Hauswald (2008) show further that a bank's relative reliance on public or private information determines the trade-off between availability and pricing of credit across loan types and borrowers. Behr et al. (2013) add the findings that an increase in relative borrowing from local state-owned banks (i.e., rather small and decentralized) significantly reduces SMEs financial constraints, while there is no such effect for privately owned banks (i.e., large and centralized). Beck et al. (2013) on the contrary find no evidence for smaller institutions being better in the provision of access to finance.

Another function of banks in the context of relationship lending is the role as delegated monitors (Diamond 1984, 1996). By pooling funds and taking up the task of monitoring single borrowers, banks improve the capital allocation on a market and more entrepreneurs will have access to credits. Close and long-term relationships between banks and customers will further facilitate this role as delegated monitors and simultaneously reduce asymmetric information (Boot & Thakor 2000). These findings are somewhat contrary to the study by Petersen & Rajan (1995) who show that banks are more likely to finance firms when credit markets are concentrated because it is easier for them to internalize the benefits. Elsas (2005) shows that when banks can observe the payment history of their customer over a longer time, they can also better predict future payments and better judge a borrowers creditworthiness. Petersen & Rajan (1994) present additional evidence that companies have better credit availability when they spent a longer time with one bank while Alessandrini et al. (2009) survey the existing literature for the continuing importance of local credit markets for small borrowers and regional economic development.

A further important theoretical consideration comes from the paper by Sharpe (1990). Successful interactions between customers and banks depend not only on the creditworthiness of borrowers but also on the information transmission and trustworthy behavior of banks. Fischer & Pfeil (2003) report that bank regulation is often blamed for reducing competition and the hindering the functioning of market forces in the financial sector.

The stability of financial services firms is then paid for with a worse credit allocation for financially constraint firms and entrepreneurs.

A last point on relationship lending is the paper by Hakenes et al. (2015). According to their model, the existence of small banks positively influences regional economic development. Due to asymmetric information and credit rationing in the absence of small decentralized banks, capital will flow from economically less-developed regions to well-developed centers.¹

The form and structure of the banking system is, thus, directly related to the access to financial services and to financial development and integration. Its positive effects on economic growth, meanwhile, is without doubt across scholars in the literature, while the effect on income inequality is more diverse. The access to financial development strongly influences the access to credit for people without inherited wealth. With better financial intermediation and increased access to financial services, these people can overcome credit constraints which would otherwise prohibit them from optimally investing in their education and starting their own businesses which will in turn increase economic growth and close the income gap between the rich and poor (Beck et al. 2007, Levine 2005). On the one hand, with regard to inequality, increased access to financial services and a more liberal financial system can lead to more equal opportunities for the whole economy such that entrepreneurs with good ideas which were before restricted by credit constraints can work on their business ideas (Galor & Zeira 1993, Galor & Moav 2004). On the other hand, a laxer financial system can also lead to powerful elites capturing all the benefits from more financial intermediation, while leaving the poor behind (Ang 2010).

Nevertheless, there is also a branch in the literature that argues for negative affects of financial liberalization and integration on economic development and the notion that there can be "too much finance" as in the studies by, e.g., Beck et al. (2014), Arcand et al. (2015), or Law & Singh (2014). They all find that financial deepening and an expansion of credit is only beneficial to economic growth up to a certain point. When financial development goes too far, the positive effects either vanish or even turn negative.

Capelle-Blancard & Labonne (2016) further stress that the output of financial activities cannot be solely measured with conventional variables such as credit volume but also through its inputs (e.g., the number of employees in the financial sector) or through the efficiency of financial intermediation. They find no positive relationship of financial deepening on economic growth for OECD countries. We also argue for a set of more detailed financial development variables. More banks with, consequently, more branches and ATMs spread across all regions in a country constitute such financial development on the very level of single customers and might have great implications for economic growth and

¹This is also related to the paradox by Lucas (1990) and the observation that capital does not flow from developed countries to less-developed nations, although, developing countries show lower levels of capital per worker.

income inequality. However, increasing competition through financial integration could also force banks to close branches and the availability of financial services to every region in an economy might decrease, with entrepreneurs not getting the money to build their businesses and an inefficient capital allocation as a result.

The effect of bank branch deregulation in the U.S. or emerging markets such as India was intensively investigated by many researchers, such as in Beck et al. (2010), Morgan et al. (2004) and Demyanyk et al. (2007) for the case of the U.S. or in Jayaratne & Strahan (1996), Ang (2010), and Gormley (2010) for the less developed India. However, the harmonization and integration of the financial system in Europe was so far less in the focus of academia and, therefore, this paper will fill an important gap in the literature on the finance-growth and finance-inequality nexus, while also giving some policy implications for European lawmakers. However, contrary to the paper by Capelle-Blancard & Labonne (2016) our results show a positive effect of financial deepening.

Baltzer et al. (2008) look at the financial integration of new member states compared to the European benchmark. They focus mainly on the accessions to the East of 2004 and 2007.² An important finding is the big foreign bank presence in the new member states which is mainly driven by EU banks. Foreign bank presence, therefore, increased from 30% in 1997 to roughly 75% in 2005, with Nordic banks increasing their representation in Baltic states, while Austrian and Italian banks opened up branches in neighboring Central European states. While Cyprus only had a very small fraction of total banking assets held by foreign banks, especially Slavic and Eastern European states had a high foreign bank activity. Further evidence on the effects of increased globalization on the structure of financial systems is given in Claessens & van Horen (2014).

In this context, especially scholars from Central and Eastern European countries see the high percentage of foreign bank ownership critical. Blažek & Hejnova (2020) show that after the trend of globalization, digitization and the impact of recent crises led to a decline in the number of small financial centers in Europe. The financial performance of banks headquartered in these small financial centers depends significantly upon the European region they are located in and their ownership structure. The capital inflow from Western banks on the one hand made the Eastern European financial sector one of the most dynamic but the high external dependency of those financial centers also prevents the development into fully fledged financial systems that offer a broad variety of functions and services. Marer (2010) previously stressed in the aftermath of the financial crisis that Eastern European countries have to rely more on internally-generated sources of capital to boost economic growth and increase their competitiveness. Gal & Schmidt (2017) further show that the financial crisis exposed the systemic vulnerability of Eastern European economies that relied too much on foreign investments for economic growth and

²The new member states in 2004 were the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, and Slovakia as well as on Romania, Bulgaria, Slovenia and Cyprus which joined the EU in 2007.

failed to generate domestic capital accumulation.

With the motivation to improve harmonization and increase competition on Europe's financial markets, the Second Banking Coordination Directive established a Single Banking License across the participating European countries after 1992 (Shaffer 2001, European Commission 18.12.1992), which obliged them to treat banks from other European member states in the same way as domestic banks and to banish any limitations on foreign European banks. The previously mentioned factors from the literature then stress the potentially very high importance of the Single Banking License for the integrated European financial market. It enables banks from EU member states to freely branch into other states of the Union without any barriers to restrict their business. This integration of the banking systems improves the transfer of technologies and human capital to new and maybe less developed states which could then benefit from an accelerated convergence to Western banking and development standards of the Union's founding members, such as Germany and France. Through more competition on the financial markets, banks become more efficient and borrowing costs will decrease. This enables even poorer people to get access to funding and loans, since credit barriers are reduced, and the credit allocation becomes more efficient. This should then lead to higher economic growth and less income inequality, as more people will have access to capital to do investments into their own businesses to invest efficiently in human capital and by that improve their incomes (Greenwood & Jovanovic 1990, Galor & Zeira 1993, Galor & Moav 2004).

Beccalli & Rossi (2020) give additional evidence on the convergence of EU member states and show that European banks became more similar after the financial crisis of 2008 and the following regulatory efforts by the EU. The resulting separation of commercial and investment banking activities generates economic inefficiencies of costs and at the same time efficiencies on revenues and profits. Thus, the focus of our paper will mainly rest on banks, since they provide the most direct financial services and access to loans which should foster economic growth and a closing of the income gaps between and within states.

For our theoretical footing, we argue in favor of the supply-leading hypothesis by, e.g., Schumpeter (1969), McKinnon (1973), or Levine (2005) that more financial development and access to financial services leads to economic development. This hypothesis is contrasted by the demand following view of, e.g., Robinson (1952), which states that a growing economy has a higher demand for output which necessitates more investments and financial services to meet this demand. This issue of possible reverse causality can be addressed by means of treatment effects as done by e.g. Jayaratne & Strahan (1996). In this paper, the authors use the aforementioned sequential deregulation of bank branching restrictions in the U.S. in the 20th century (Kroszner & Strahan 1999) to identify the effect of financial integration on economic growth. Such deregulation leads to a significant entry of banks into local markets (Amel 1993), consolidation of smaller banks into larger

holdings (Savage 1993, Calem 1994), and the conversion of existing bank subsidiaries into branches (McLaughlin 1995) with major effects on the growth performance of the underlying states.

Beck et al. (2007) and Beck et al. (2010) use the same natural experiment of U.S. bank branching deregulation and bridge the gap to inequality by looking at the income distribution in U.S. states, finding a positive effect of financial integration on the incomes of the lowest earners, while leaving the top incomes mostly unaffected. Before deregulation, banking competition in the U.S. was very low, therefore protecting local banking monopolies and impeding the incomes of the relatively poor by imposing credit constraints (Hammond 1957, Bodenhorn 2003).

Ang (2010) adds to the literature with the natural experiment of deregulation of foreign bank entry in India. The results are ambivalent with the possibility of financial development going too far. In line with the arguments by Claessens & Perotti (2007), financial integration could also be used by politically powerful elites to capture all the benefits from it, while leaving the poor behind. While authors like Rajan & Zingales (2003) support these findings and state that improvements in the financial sector primarily benefit the rich, studies like the one by Burgess & Pande (2005) find that the increased spread of the financial sector also reaching into the rural areas of India positively affected the incomes of the poorer population there.

The natural experiments of bank branch deregulation in the U.S. and India are also used in financial and entrepreneurial economics like, e.g., Demyanyk et al. (2007) who look at the effects of bank branching deregulation on small businesses and the consumer economic choice of insurance of personal income. Gianetti & Onega (2005) with their analysis of entrepreneurial activity, or Gormley (2010) who investigate the Indian deregulation and its effects on credit allocation for Indian companies complement this part of the literature and find a clear cream-skimming behavior of newly entering foreign banks.

In the present paper, we exploit a similar natural experiment in the European Union and the staggered entry of countries into the EMU and Single Banking License which allows banks from these countries to operate in other European member states without any hurdles. This natural experiment starting with the introduction of the Single Banking License in 1993 offers the similar advantage of a staggered treatment (which will be discussed later), however the treatment itself is not as sharp as, e.g., the bank branching deregulation in the U.S., since we cannot identify single banks and their exact entry into the Union. Nevertheless, the wholesome change of the competitive environment on European financial markets still offers a suitable econometric set up to investigate the effects of financial integration on economic development. The aforementioned literature on relationship lending and decentralized banking systems adds further theoretical support to our argument of causality running from finance to growth.

B.3 Data

The data on GDP per capita stems from the World Development Indicators provided by the World Bank. The data on income inequality is measured by the Gini coefficient which comes from various sources: Data from Eurostat, the World Bank, and the work of Deininger & Squire (1996) are combined to ensure a long line of data points which covers as many years as possible for each country. The Gini coefficients are computed from the disposable income of households to ensure that social transfers or redistribution do not alter the income distribution or bias the results. Furthermore, this covers the purchasing power of households, which is especially important in an European context, since especially countries of the later expansions to Eastern Europe are poorer than others but also show lower costs of living. Effects on the income distribution might have a bigger impact in such countries.

All in all, this results in a sample of 30 countries of the European area lasting from 1975 to 2016. The countries of the sample are the 27 current members of the European Union, the UK which left the Union on 31 January 2020 with Brexit, as well as the associated states Iceland and Norway which are also members of the Single Market and, therefore, benefit from the Single Banking License. Switzerland is excluded, since its banks and European banks operating in Switzerland do not fall under the same regulations, while Lichtenstein is a member of the Single Market but delivers no data on the variables described in the following.

The control variables are secondary school enrollment in percent of the population, trade openness as the sum of imports and exports over GDP, and final government consumption in percent of GDP. These are quite standard in the literature. Furthermore, these control variables help to distinguish the effects of a new banking environment from other effects resulting from a countries accession to the EU. Especially trade and government consumption will change if a country enters the Union. Our control variables capture these effects in such a way that the dummy for the SBL, as explained in the following chapter, will show the effect of the Single European financial market. Additionally, we will include the common measure of financial development: domestic credit granted to the private sector relative to GDP. As the introduction of the Banking Passport is a form of liberating the financial sector, this might work through the same channels as financial development. Data for these measures also comes from the World Development Indicators.

All in all, we have a sample of 1260 country-year observations. However, the number of observations varies from regression to regression, since not all variables are available for each country in each year. Two other very important variables which are suited to better identify the effects of the entry into the European Single Banking Market are the top and bottom 20% income shares. Since the Gini coefficient lacks sensitivity for the heads

Table B.1: Summary Statistics

	Mean	Median	Std. Dev.	Obs.
GDP pc (in 2010 US \$)	21,342.29	15,590.88	18,739.11	1,082
Highest 20% income shares (%-share of inc. dist.)	39.08	39.25	2.85	342
Lowest 20% income shares (%-share of inc. dist.)	8.12	8.20	1.22	342
Gini (from 0 to 100)	29.76	30.00	4.70	815
Sec. school enrollment (in % of population)	95.37	96.25	16.37	1,061
Trade (in % of GDP)	92.68	75.97	55.74	1,064
Government cons. (in % of GDP)	19.56	19.32	3.17	1,081
Unemployment (in %)	7.92	7.15	4.61	1,053
DCPS (in % of GDP)	68.87	61.80	42.49	1,008

and tails of the income distributions, these indicators are used as additional dependent variables to better distinguish the effects of financial liberalization in Europe on different income groups. Lastly, we also include the unemployment rate from the World Bank's World Development Indicators, first as a control variable and later on as a dependent variable to capture an additional link through which financial integration could have influenced the economies of the European member states.

Summary statistics are shown in Table B.1. For the variables of interest, the average inequality lies at a Gini coefficient of 29.76 with the minimum of 23.4 in the Slovak Republic and a maximum of 35.98 in Portugal. The average citizen earns \$21,342. Big variations across the countries in our sample are visible for trade and domestic credit to the private sector. Additionally, we checked for correlations between the underlying variables which are reported in Table B.2 to prevent potential multicollinearity between the explanatory variables.

Possibly problematic correlation coefficients higher than 0.3 are present for the variables of school enrollment and domestic credit to the private sector. As we will see during the later robustness checks, regressions without these two measures deliver qualitatively similar results. The high correlation between the Single Banking License dummy and GDP per capita is not surprising and shows that there is an underlying relationship between European financial integration and economic growth.

Table B.2: Correlation Matrix

	GDP pc	SBL	Gini	School.	Trade	Govern.	Unempl.	DCPS
GDP pc	1.000							
SBL	0.597 ***	1.000						
Gini	-0.228 ***	0.093 ***	1.000					
Schooling	0.319 ***	0.460 ***	-0.118 ***	1.000				
Trade	0.235 ***	0.229 ***	0.071 *	0.101 ***	1.000			
Government	0.266 ***	0.147 ***	-0.303 ***	0.309 ***	-0.087 ***	1.000		
Unemployment	-0.215 ***	0.091 ***	-0.224 ***	0.105 ***	-0.059 *	0.037	1.000	
DCPS	0.332 ***	0.328 ***	-0.163 ***	0.391 ***	0.120 ***	0.055 *	0.024	1.000

Pairwise Pearson correlation coefficients of the underlying set of variables. ***, **, * represent significance at the 1, 5, 10% level respectively.

B.4 Methodology

For the estimation of the effect of financial integration through the introduction of the Single Banking License and the Banking Passport in 1993 on economic growth and income inequality, we estimate the following regression equation using a difference-in-difference approach:

$$Y_{i,t} = \alpha + \beta \cdot SBL_{i,t} + \gamma \cdot \mathbf{X}_{i,t} + \sigma_i + \tau_t + u_{i,t},$$

where $Y_{i,t}$ is the dependent variable, thus, either economic growth or wealth measured by the logarithm of GDP per capita, income inequality measured by the Gini coefficient, income shares of the top and bottom 20%, or the unemployment rate. The indices $i = 1, \dots, 30$ and $t = 1975, \dots, 2016$ stand for the different member states and associated states in the sample and for the sample's time span respectively. Economic growth is defined not as a growth rate, but as the overall change in the economic wealth of a nation.³ Thus, we use the logarithm of GDP to normalize the distribution across the sample. $SBL_{i,t}$ is a dummy variable which is equal to one if the country joined the European Single Market and, thus, enjoys the Banking Passport for its domestic banks in other EU member states, and zero otherwise. It is constructed by combining the time of the change in legislation and a dummy which determines whether the country belongs to the EU and is in the treatment group. The dummy is zero if the country does not belong to the member states and is, therefore, in the control group. The coefficient of interest is consequently β which gives the effect of the Single Banking License on the dependent variables if the country joined the Single Market. $\mathbf{X}_{i,t}$ is a vector of control variables, including secondary school enrollment, trade openness measured by the sum of imports and exports divided by GDP, final government consumption relative to GDP, and domestic credit to the private sector relative to GDP to control for the effects of financial development. σ_i gives country-fixed

³For examples of this approach see Acemoglu (2009).

effects to control for potential endogeneity resulting from country-specific, time-invariant characteristics, while τ_t gives year-fixed effects to control for business cycle fluctuations and other events, like changes in legislation and regulation, long term trends, or changes in labor force participation (Beck et al. 2010, Gormley 2010) that might bias the results. Year-fixed effects are especially important, since besides efforts to enter the European Single Market, most likely, many other changes in legislation have occurred simultaneously in our sample-countries to fit European policies and requirements. These policy changes are also eliminated by using fixed effects for the time span and, therefore, should not bias the results. This approach is quite common in the literature, e.g., in Benfratello et al. (2008).

We further validate the fixed effects approach by performing the test by Hausman (1978) which rejects the null hypothesis of a preferred random effects model for all regression specifications. We also run a common Wald test to check whether all time dummies for the different years are jointly equal to zero. For all alternatives of the dependent variables, the inclusion of time-fixed effects is appropriate.

Of course, this identification strategy rests on the assumption that the group of countries which entered the European Single Market would have behaved the same, given they would not have entered the market, as the countries which did not enter. To ensure this common or parallel trends assumption, our specification uses the staggered entering of countries into the Single Market to its advantage. In a standard difference-in-difference setting, the observations of the control and treatment group are assumed to follow a common trend before the treatment occurs to give valid results. However, with multiple treatment periods, it has to hold that the treatment is the same across all instances and that the effect is not solely driven by one group of observations to give consistent results.⁴

Table B.3 shows the step-by-step expansions of the EU’s reach across Europe. As a result, five different timings⁵ of the entry into the SBL are possible and captured by our indicator variable. Consequently, the multiple timing of ”treatments” increases the robustness of the estimation and makes sure that the effect stems from the entry into the SBL and did not occur by chance. Meanwhile, potential concerns of the violation of the parallel trends assumption are mitigated.

All in all, our identification strategy differs to some extent from studies of bank deregulation in the U.S. or in, e.g., India, since in these examples, the authors relied on actual opening dates of foreign, or cross-state banks, while our data describe the legislative possibility of opening branches in different EU member states. These political intentions and the progress of the European integration constitute a high level of financial integration across a broad sample of countries which is only topped by the introduction of the Euro

⁴Examples of this can be found for example in Bertrand & Mullainathan (2003) or Gormley & Matsa (2011).

⁵These are 1993, 1995, 2004, 2007, and 2013.

Table B.3: Development of the Expansion of the European Union

Country	Member of the EU since	Remarks
Belgium, France, Germany, Italy, Luxembourg, Netherlands	1958	Original signatory states of the 1957 Treaty of Rome.
Denmark, Ireland, United Kingdom	1973	
Greece	1981	
Portugal, Spain	1986	
Austria, Finland, Sweden	1995	
Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia	2004	
Bulgaria, Romania	2007	
Croatia	2013	
United Kingdom	2020	Left as a member of the EU after Brexit.

In accordance with <https://www.europarl.europa.eu/factsheets/de/sheet/167/die-erweiterung-der-europaischen-union>.

as a common European currency in 1999 and describes a wholesome change in the competitive environment on the European financial market. The sole possibility of foreign competitors might change the lending behavior of banks and eases credit restrictions and local monopolies with the result of a more efficient capital allocation. In the existing literature, Benfratello et al. (2008) and Harrison et al. (1999) show evidence on the channels, through which more competition on financial markets affect economic growth. This argument is also valid in recent times of increased digitization which renders an actually physically present bank branch obsolete, while still holding up competition between banks of different states on one single market.

Furthermore, it is important to note that the introduction of the Single Banking License was the major event of changes in European legislation in 1993. There were no other big events during that time and we can assume the fundamental change in the competitive environment due to a further development of the Single European Market to be the main driver of growth and inequality in our analysis. Naturally, the complete process of European integration will most certainly have influenced the growth prospects of the members of the EU and led to a convergence of member states to one European level of development. Nevertheless, with the design of our identification strategy and selection of control variables we are able to extract that part of economic growth and inequality which is attributed to financial development. Our control variables (trade, schooling, government consumption, and financial development given by domestic credit to the private sector) cover the effects of standard drivers of growth and inequality, while our fixed-effects capture any influence from other changes in legislation and regulation

stemming from European integration.

To give further proof, we run our regressions with a sample restricted to the countries that entered the EU before 1993 to see whether they experienced the same effects from the introduction of the SBL and that our results are not driven by the overall effects of EU integration for the countries entering after 1993.

B.5 Results

The first relationship under investigation is the effect of the Single Banking License on economic growth in the European Union. The results of the panel regressions with country and year fixed effects are reported in Table B.4.

Column (1) presents the results for the full sample and shows that the introduction of a single European banking market has a positive and highly significant effect on growth in the European member states. We define growth here not as a growth rate but positive change in the overall wealth of a nation. The coefficient of the financial integration dummy for the whole sample of nations can, therefore, be interpreted as an increase of $[exp(0.345) - 1] \cdot 100 = 41\%$ in the average GDP per capita of the member states of the European Single Market across the whole time span of the sample.

Additionally, we construct several subsamples to investigate different groups of countries. Column (2) of Table 1 gives results for countries with higher inequality, measured by a Gini coefficient above the average, while column (3) gives the estimates for countries with a below average inequality index. The positive effect of financial integration remains in both subgroups, with constantly high significance. Columns (4) and (5) now divide the sample into above average GDP per capita (developed countries) and below average GDP per capita (less developed countries) respectively. Here, the positive effect still pertains, yet only with significance for under-developed countries. Lastly, columns (6) and (7) separate the countries of the EU into a group with an above average unemployment rate and a group with an unemployment rate below the average. The indicator for the Single Banking License still enters positively at the 1% significance level.

Therefore, with respect to economic growth, the introduction of the Single Banking License in 1993 can be seen as quite positive. Independent of the sample of countries, the indicator is almost always growth enhancing and significant. Especially the significant improvement for underdeveloped European countries compared to their counterparts with higher GDP per capita suggests that the opening and integration of the European financial market led to a positive development in the European Union. It is also in line with the study presented by Claessens & van Horen (2014), who show that foreign bank presence is particularly pronounced in lesser developed countries. These countries open up to financial integration and, by that, are able to improve their economic prospects.

The set of control variables are also mostly in line with what should be expected. When

significant, secondary school enrollment is growth boosting, while higher unemployment and government consumption reduce economic growth. Meanwhile, the coefficient for the Gini control variable entered positively (except for the subsample of developed countries and high unemployment countries but twice without significance) and would, therefore, suggest that higher inequality boosts economic growth. This would be in line with theories that predict that by a more unequal distribution of incomes, people at the lower end of the income distribution are more motivated to catch up and, thus, growth would rise. This links to older theoretical models on the relationship between economic growth and inequality but goes against more recent empirical findings (Aghion et al. 1999). However, Barro (2000) found a hindering effect of inequality on the growth of poor nations, while richer countries benefited from inequality. One can assume that the European member states belong to the more wealthy countries in the world, what would fit to this findings. In the European community, this could point at more unequal countries trying to move up closer to the leading member states by improving their growth prospects. At the same time, richer countries which already were members of the EU for a longer time (e.g., Germany, France, ...) benefit too, through trade linkages with new member states (e.g., Eastern Europe), that increase their economic growth and wealth. Contributing to this argument, trade openness enters positively when significant. The control for domestic credit to the private sector, however, almost always enters insignificantly with a very small coefficient, suggesting that the biggest part of the effect of financial development is captured by the Single Banking License dummy. Furthermore, the within R^2 is quite high. Naturally, this stems from the inclusion of the year and country dummies, but also suggests that the set of explanatory variables is chosen well.

In the next step, the effect of the increased market integration in the EU on income inequality in the member states is estimated. The results of the fixed effects difference-in-difference panel estimations are reported in Table B.5 with the Gini coefficient as dependent variable. Column (1) represents again the whole sample and shows a negative coefficient, however, not significant at the common levels. Although the estimate lacks significance, a negative coefficient here means a decreasing Gini coefficient due to banking integration and, thus, reduced income inequality.

Significance is also an issue in the other subsamples, except for column (3) and the more equal countries. Here, the coefficient is also negative, but highly significant and suggests that these countries were able to reduce their inequality even further with an entry into the European Single Market. However, it is also evident that the impact of the Single Banking License on inequality is very hard to identify. The far lower within R^2 shows that there might be other factors at work that primarily shape income inequality in the European Union. The set of control variables commonly used in inequality regressions also struggles with significance but is in line with the expected signs. GDP per capita enters negatively, thus, inequality reducing but with a rather small coefficient size. The

Table B.4: The Single Banking License and economic growth

log GDP per capita	Full sample		Inequality		Eco. development		Unemployment	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
SBL	0.345 *** (0.029)	0.457 *** (0.039)	0.180 *** (0.044)	0.091 (0.057)	0.104 ** (0.043)	0.312 *** (0.040)	0.346 *** (0.041)	
Gini	0.011 *** (0.002)	0.012 ** (0.005)	0.014 *** (0.005)	-0.003 (0.002)	0.007 ** (0.003)	0.002 (0.004)	0.014 *** (0.003)	
Schooling	0.001 (0.001)	-0.002 (0.002)	0.002 (0.001)	0.001 (0.001)	0.004 ** (0.002)	-0.001 (0.002)	0.003 ** (0.001)	
Trade	0.001 ** (0.001)	-0.001 (0.001)	0.001 (0.001)	0.001 ** (0.0004)	-0.001 (0.001)	0.001 (0.001)	0.001 ** (0.001)	
Government	-0.028 *** (0.005)	-0.028 *** (0.006)	-0.036 *** (0.009)	-0.001 (0.006)	-0.016 *** (0.006)	-0.040 *** (0.007)	-0.019 ** (0.008)	
Unemployment	-0.010 *** (0.002)	-0.013 *** (0.003)	-0.002 (0.005)	-0.014 *** (0.002)	-0.006 ** (0.003)	-0.010 *** (0.003)	-0.017 ** (0.007)	
DCPS	0.0003 (0.0003)	0.0004 (0.0004)	0.00002 (0.0005)	0.0001 (0.0002)	0.001 ** (0.001)	0.00002 (0.0004)	0.001 (0.0004)	
Constant	8.245 *** (0.160)	8.232 *** (0.264)	8.739 *** (0.263)	10.620 *** (0.178)	7.183 *** (0.222)	10.390 *** (0.282)	8.257 *** (0.217)	
Observations	632	345	287	308	324	298	334	
Within R^2	0.933	0.938	0.937	0.934	0.958	0.934	0.949	
Overall R^2	0.270	0.271	0.333	0.384	0.068	0.231	0.319	
Country FE	YES	YES	YES	YES	YES	YES	YES	
Year FE	YES	YES	YES	YES	YES	YES	YES	

All regressions are done with fixed effects within regressions using country and year-fixed effects. The dependent variable is the logarithm of real GDP per capita, while the Gini coefficient, secondary school enrollment, trade openness, final government consumption, the unemployment rate, and domestic credit to the private sector are used as control variables. Column (1) uses the whole sample. Column (2) reports results for countries with a Gini above the average, while column (3) does so for countries below the average. Column (4) gives the results for countries with a GDP p.c. above the average, while column (5) reports results for countries below the average. Column (6) gives results for the subsample of countries with above average unemployment, while column (7) gives the results for below average unemployment countries. ***, **, * represent significance at the 1, 5, 10% level respectively. Standard errors are in parentheses.

Table B.5: The Single Banking License and income inequality

Gini coeff.	Full sample		Inequality		Eco. development		Unemployment	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
SBL	-0.945 (0.587)	0.749 (0.565)	-1.908*** (0.603)	1.325 (1.587)	0.043 (0.963)	-0.958 (0.756)	-0.755 (0.980)	
GDPpc	-0.0001*** (0.00002)	-0.0001** (0.00003)	-0.00001 (0.00002)	-0.00004* (0.00002)	-0.0002 (0.0001)	-0.0002*** (0.0001)	-0.00002 (0.00003)	
Schooling	0.017 (0.017)	0.026 (0.022)	-0.022 (0.014)	-0.010 (0.017)	0.020 (0.043)	-0.053** (0.026)	0.080*** (0.026)	
Trade	0.014 (0.009)	0.009 (0.009)	0.011 (0.008)	0.025** (0.012)	-0.023* (0.013)	-0.015 (0.013)	0.032** (0.013)	
Government	-0.301*** (0.094)	-0.049 (0.087)	-0.318*** (0.116)	-0.346** (0.161)	-0.356*** (0.127)	-0.158 (0.120)	-0.366** (0.169)	
Unemployment	0.090** (0.044)	0.130*** (0.038)	0.198*** (0.065)	0.168*** (0.056)	0.069 (0.066)	0.022 (0.057)	0.402*** (0.152)	
DCPS	-0.009* (0.006)	0.001 (0.005)	0.015** (0.006)	0.002 (0.006)	-0.013 (0.013)	0.005 (0.007)	-0.016* (0.009)	
Constant	35.86*** (2.660)	37.65*** (2.746)	31.08*** (2.824)	32.84*** (4.603)	35.52*** (4.438)	48.07*** (5.014)	29.74*** (4.441)	
Observations	632	345	287	308	324	298	334	
Within R^2	0.161	0.305	0.313	0.364	0.247	0.245	0.275	
Overall R^2	0.179	0.162	0.098	0.215	0.027	0.084	0.105	
Country FE	YES	YES	YES	YES	YES	YES	YES	
Year FE	YES	YES	YES	YES	YES	YES	YES	

All regressions are done with fixed effects within regressions using country and year-fixed effects. The dependent variable is the Gini coefficient, while GDP per capita, secondary school enrollment, trade openness, final government consumption, the unemployment rate, and domestic credit to the private sector are used as control variables. Column (1) uses the whole sample. Column (2) reports results for countries with a Gini above the average, while column (3) does so for countries below the average. Column (4) gives the results for countries with a GDP p.c. above the average, while column (5) reports results for countries below the average. Column (6) gives results for the subsample of countries with above average unemployment, while column (7) gives the results for below average unemployment countries. ***, **, * represent significance at the 1, 5, 10% level respectively. Standard errors are in parentheses.

Table B.6: The Single Banking License and Unemployment

Unemployment rate	Full sample		Inequality		Eco. development		Unemployment	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
SBL	-0.686 (0.567)	-2.979 *** (0.879)	2.049 *** (0.623)	0.377 (1.751)	0.067 (0.925)	-1.078 (0.870)	-0.284 (0.396)	
GDPpc	-0.00004 ** (0.00002)	-0.0001 ** (0.00004)	0.00003 (0.00002)	-0.0001 *** (0.00002)	0.0001 (0.0001)	-0.0002 ** (0.0001)	-0.00002 ** (0.00001)	
Gini	0.084 ** (0.041)	0.325 *** (0.094)	0.212 *** (0.069)	0.204 *** (0.068)	0.063 (0.061)	0.029 (0.076)	0.066 *** (0.025)	
Schooling	-0.038 ** (0.016)	-0.020 (0.035)	-0.014 (0.015)	0.017 (0.018)	0.006 (0.042)	0.007 (0.030)	-0.024 ** (0.011)	
Trade	-0.001 (0.009)	-0.008 (0.015)	0.001 (0.009)	0.020 (0.013)	-0.006 (0.013)	-0.019 (0.015)	0.003 (0.005)	
Government	0.330 *** (0.090)	0.354 *** (0.136)	0.158 (0.122)	-0.127 (0.179)	0.169 (0.124)	0.206 (0.138)	0.104 (0.069)	
DCPS	-0.007 (0.005)	-0.003 (0.008)	-0.008 (0.007)	-0.011 * (0.006)	-0.007 (0.012)	-0.011 (0.009)	-0.007 * (0.004)	
Constant	-2.416 (2.953)	-14.610 *** (5.586)	-2.845 (3.656)	4.695 (5.555)	0.178 (4.777)	14.040 ** (6.761)	0.759 (1.943)	
Observations	632	345	287	308	324	298	334	
Within R^2	0.248	0.397	0.383	0.403	0.300	0.253	0.340	
Overall R^2	0.172	0.269	0.004	0.268	0.029	0.096	0.270	
Country FE	YES	YES	YES	YES	YES	YES	YES	
Year FE	YES	YES	YES	YES	YES	YES	YES	

All regressions are done with fixed effects within regressions using country and year-fixed effects. The dependent variable is the unemployment rate, while GDP per capita, the Gini coefficient, secondary school enrollment, trade openness, final government consumption, and domestic credit to the private sector are used as control variables. Column (1) uses the whole sample. Column (2) reports results for countries with a Gini above the average, while column (3) does so for countries below the average. Column (4) gives the results for countries with a GDP p.c. above the average, while column (5) reports results for countries below the average. Column (6) gives results for the subsample of countries with above average unemployment, while column (7) gives the results for below average unemployment countries. ***, **, * represent significance at the 1, 5, 10% level respectively. Standard errors are in parentheses.

coefficient for schooling changes sign frequently and is insignificant. Trade enters, as expected, inequality increasing but also lacks significance.

Government consumption on the other hand is negative and significant for the whole sample as well as several subsamples. Investments by the government or the public sector, therefore, decrease inequality and could be interpreted as smaller business also profiting from governmental contracts and by that increasing the incomes of their employees. Higher investments by the government come with a greater demand and, thus, more job opportunities, which put more people into work and give them the chance to increase their incomes. This will close the income gap and by that reduce inequality. As we will show later, these effects on the unemployment rate are also present in our data. The unemployment rate enters significant and of course inequality increasing, while domestic credit shows little significance and changing signs as well. Again, the finance-inequality nexus is mainly captured by the financial integration indicator, although, domestic credit reduces inequality for the whole sample at the 10% significance level, supporting the interpretation of financial development as inequality reducing.

Table B.6 now gives the estimates for regressions with the unemployment rate as dependent variable to further investigate through which channels the introduction of the Single Banking License worked. Here, the indicator for the Single Banking License only enters significantly in the subsamples of more unequal and more equal countries. Interestingly, the unemployment rate goes down for countries with higher inequality, while it increases in countries with previously lower income inequality. This can be interpreted as more unequal countries improving employment and putting more people into labor and by that closing the gap between the two ends of the income distribution with more developed countries facing more competition across sectors and, therefore, tougher conditions on the labor market. For the control variables, GDP per capita, schooling and trade openness reduce the unemployment rate; however, only GDP and schooling do so significantly. Domestic credit also enters negatively but again without a significant estimate. The Gini coefficient and government consumption on the contrary enter with a positive sign, thus, increasing unemployment.

The results shown above, point at the difficulties with inequality regressions to find a clear-cut effect⁶. The Gini coefficient as dependent variable might have some weaknesses, most prominently the insensitivity to the top and bottom end of the income distribution. This is why in Table B.7, the lowest and highest 20% of the income shares are used as dependent variables. It is very interesting to see how the different ends of the income distribution react to the introduction of the Single Banking License and by that, further insights into the development of income inequality due to financial integration in Europe could be found.

Panel (A) of Table B.7 gives the results for the top of the income distribution, while

⁶Similarly to the results of Barro (2000).

Table B.7: The Single Banking License and income shares

	Full sample	Inequality	Eco. development		Unemployment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(A) Income share highest 20%							
SBL	-0.461 (0.523)	-0.518 (0.606)	-1.526 (1.041)		-0.003 (0.523)	-0.007 (0.678)	-0.469 (0.795)
Observations	316	173	143	192	124	144	172
Within R^2	0.237	0.249	0.539	0.223	0.528	0.439	0.315
Overall R^2	0.166	0.222	0.006	0.145	0.141	0.036	0.079
(B) Income share lowest 20%							
SBL	0.470 *** (0.139)	0.476 *** (0.159)	-0.309 (0.296)		0.351 * (0.183)	0.597 *** (0.203)	0.373 * (0.209)
Observations	313	170	143	190	123	142	171
Within R^2	0.615	0.648	0.729	0.591	0.717	0.774	0.438
Overall R^2	0.385	0.243	0.300	0.642	0.263	0.332	0.132
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES

All regressions are done with fixed effects within regressions using country and year-fixed effects. The dependent variable is in panel (A) the income share of the top 20% of the income distribution and in panel (B) the income share of the bottom 20%, while GDP per capita, the Gini coefficient, secondary school enrollment, trade openness, final government consumption, and domestic credit to the private sector are used as control variables. Column (1) uses the whole sample. Column (2) reports results for countries with a Gini above the average, while column (3) does so for countries below the average. Column (4) gives the results for countries with a GDP p.c. above the average, while column (5) reports results for countries below the average. Column (6) gives results for the subsample of countries with above average unemployment, while column (7) gives the results for below average unemployment countries. ***, **, * represent significance at the 1, 5, 10% level respectively. Standard errors are in parentheses.

panel (B) refers to the bottom income groups. The same set of control variables as before was used but is not reported due to space restrictions. The indicator of the Single Banking License now yields negative coefficients for the top income share, but without significance for the different samples. Nevertheless, combined with the always positive and significant results for the bottom income share, these estimates are very insightful. The introduction of the Single Banking License in the EU and the following financial integration, increased incomes for poorer households while reducing or keeping constant the incomes of the top earners. Consequently, this leads to a closing of the income gap and reduces inequality within the European Union, similar to the results by Beck et al. (2007).

Taking a closer look at the different subsamples also reveals which countries profit from further financial development. Columns (2) and (3) show that the bottom of the income distribution in the previously more unequal countries gains, while the coefficient for the more equal countries is insignificant. Column (5) shows that the less developed member states of the Union could profit, while column (6) indicates that also countries with higher unemployment could increase the incomes of the poor; even more so than countries with lower unemployment.

For the top incomes, the coefficient of schooling was negative, thus, suggesting that higher school enrollment reduces the incomes of the richest. In developing countries, one could interpret this as reduced rent seeking by the politically powerful elites, which are confronted with more educated opponents in the rest of the population, but for mostly well-developed members of the EU this might be a bit far fetched. It is also interesting that inequality measured by the Gini coefficient increases top incomes, while it reduces the incomes of the bottom of the distribution. This might point at a vicious circle of more inequality widening the gap between the rich and the poor. Furthermore, the inclusion of the Gini coefficient as control variable is quite important, resulting in a far higher R^2 and more precisely estimated coefficients, compared to regressions without it. Also, the results are robust to only 10% of the highest and lowest income shares.

To make sure, that our results are not purely driven by the overall effects of EU integration, such as a harmonized labor market and easier international trade, we run the same regressions again for a subsample restricted to the nations that entered the European community before 1993. Table B.8 reports the results for fixed-effects regression with the logarithm of GDP per capita, the Gini coefficient, the unemployment rate and the top and bottom income shares as dependent variables.

The positive effect of financial development and integration given by the SBL on economic growth is also present for the subset of countries that entered the EU before 1993. We also find a significant negative effect of financial integration on the Gini coefficient of these countries. The coefficient on the unemployment rate is also significant but shows an increase in unemployment for the founding members and expansions of 1973, 1981, and 1986. The coefficients for the highest and lowest 20% of the income distribution are

Table B.8: Effects of the SBL on only pre-1993 countries

	GDP p.c.	Gini	Unemployment	Income shares highest 20%	Income shares lowest 20%
SBL	2.013 *** (0.002)	-7.644 ** (2.695)	6.247 * (2.414)		
Gini	0.002 (0.002)		0.033 (0.057)	0.368 *** (0.054)	-0.0924 *** (0.013)
Schooling	0.0004 (0.001)	0.042 * (0.021)	-0.030 (0.019)	-0.027 * (0.012)	0.003 (0.003)
Trade	0.001 (0.001)	0.062 *** (0.015)	0.043 *** (0.013)	0.004 (0.007)	-0.002 (0.002)
Government	-0.011 (0.007)	0.076 (0.195)	0.708 *** (0.169)	0.250 * (0.119)	0.008 (0.028)
Unemployment	-0.007 ** (0.003)	0.041 (0.071)		0.032 (0.036)	-0.046 *** (0.009)
DCPS	0.0001 (0.0002)	-0.015 * (0.007)	-0.012 * (0.006)	0.002 (0.004)	-0.0001 (0.001)
GDP p.c.		-0.0001 ** (0.00002)	-0.0001 ** (0.00002)	0.00002 (0.00002)	-0.00001 ** (0.0000)
Const.	8.729 *** (0.161)	28.641 *** (4.151)	-10.50 ** (3.993)	24.84 ** (3.488)	11.35 ** (0.830)
Observations	310	310	310	142	142
Within R^2	0.97	0.31	0.46	0.44	0.60
Overall R^2	0.70	0.01	0.01	0.62	0.54
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

All regressions are done with fixed effects within regressions using country and year-fixed effects. The sample is restricted to countries that entered the European Union before 1993. The dependent variables are (1) the logarithm of GDP per capita, (2) the Gini coefficient, (3) the unemployment rate, (4) the highest 20% income shares, and (5) the lowest 20% income shares. Additional control variables are secondary school enrollment, trade openness, final government consumption, and domestic credit to the private sector. ***, **, * represent significance at the 1, 5, 10% level respectively. Standard errors are in parentheses.

omitted. This might be the case, since the subsample of countries before 1993 do not really represent the tails of the income distribution in Europe, but rather the middle. Thus, there is only little variation that can be exploited statistically.

Thus, our SBL-dummy does not simply capture all legislative change of European integration in 1993. We can confirm the positive effects of financial development on economic growth and income inequality for a subset of countries that had already completed their European integration process long before the introduction of the Banking Passport. Nevertheless, they show the qualitatively same results as for the whole sample, i.e., we can conclude that the members of the European Union actually benefit from financial integration through a harmonized financial system.

B.6 Robustness Checks

To further check the validity of our results we perform additional robustness checks. The exclusion of secondary school enrollment and domestic credit to the private sector due to their high correlation with other explanatory variables gave qualitatively the same results. For the regressions with income inequality as dependent variable, the SBL dummy was rendered significant with a negative sign for the complete sample, thus, showing a reduction in inequality. For the unemployment regressions, the significance improved for several subsamples. Interestingly, less developed nations and states with high levels of unemployment could now significantly reduce their unemployment rate and put more people into work as seen in the Appendix in Table B.10.

Another robustness check is to cluster the standard errors at the country level. Although this is done very often in the literature and in the context of fixed effects and difference-in-difference regressions (as recommended by, e.g., Bertrand et al. (2004) or Djankov et al. (2007)), the number of possible clusters is 30 and, therefore, below the conventional level of 50 which is recommended when using clustered standard errors. Additionally, when dealing with long time dimensions as we have here, clustered standard errors could lead to bloated standard errors. However, the new set of standard errors again improves the significance of the estimates in the regressions with top income shares for the whole sample up to the 1% significance level. The other regressions are unaffected in size and signs of the coefficients.

Furthermore, we have applied tests for cross-sectional or contemporaneous correlation. Since we have a relatively large time dimension (41 years) but just a small number of observations in the cross-sectional dimension (27 EU member states, the UK, and two associated states) our sample might not be drawn randomly (Frees 1995, Driscoll & Kraay 1998). This makes sense both from an econometric and economic point of view, since the countries we observe are all European and connected through the European Union and Single Market Initiative. With standard panel estimation techniques, the estimates are still consistent, but the standard errors might be estimated too lax. Since especially the regressions with the Gini coefficient showed problems with significance, panel regressions with adjusted standard errors following Driscoll & Kraay (1998) are used to check the robustness of our results.

Our findings and their interpretations stay basically the same. For the regressions with economic growth as dependent variable, the subsamples of more equal and less developed countries lose their significance, but the findings for the whole sample and other sub-groups remain unchanged. The regressions of Table B.5 which gave the most basis for concern remain unchanged. Only the subsample of the more equal countries can significantly reduce their income inequality further. The results for effects of the Single Banking License on the unemployment rate also remain the same. The subgroups with

respect to inequality are less significant but still on the conventional levels.

Most interestingly, the results for the highest income shares are also significant now after the use of Driscoll and Kraay standard errors as one can see in Table B.9. While the signs stay negative, thus indicating a reduction of top incomes due to the European financial integration, the whole sample and the subsamples of more equal countries and below average unemployment can improve their significance remarkably. The lowest incomes meanwhile still go up and stay significant as before, supporting the previous findings of a closing of the income gap. The regressions for the subsample of pre-1993 countries also improve their significance with Driscoll and Kraay standard errors.

Table B.9: The Single Banking License and income shares (corrected s.e.)

	Full sample	Inequality		Eco. development		Unemployment	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(A) Income share highest 20%							
SBL	-0.827 ** (0.300)	-0.751 ** (0.348)			-0.319 (0.375)	-0.378 (0.340)	-1.159 ** (0.545)
Observations	313	170	143	190	123	142	171
Within R^2	0.384	0.431	0.539	0.450	0.558	0.533	0.420
(B) Income share lowest 20%							
SBL	0.470 *** (0.112)	0.476 *** (0.128)			0.351 *** (0.123)	0.597 *** (0.097)	0.373 * (0.186)
Observations	313	170	143	190	123	142	171
Within R^2	0.615	0.648	0.729	0.591	0.717	0.774	0.438
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES

All regressions are done with fixed effects within regressions using country and year-fixed effects. The dependent variable is in panel (A) the income share of the top 20% of the income distribution and in panel (B) the income share of the bottom 20%, while GDP per capita, the Gini coefficient, secondary school enrollment, trade openness, final government consumption, and domestic credit to the private sector are used as control variables. Column (1) uses the whole sample. Column (2) reports results for countries with a Gini above the average, while column (3) does so for countries below the average. Column (4) gives the results for countries with a GDP p.c. above the average, while column (5) reports results for countries below the average. Column (6) gives results for the subsample of countries with above average unemployment, while column (7) gives the results for below average unemployment countries. ***, **, * represent significance at the 1, 5, 10% level respectively. Standard errors according to Driscoll & Kraay (1998) are in parentheses.

B.7 Conclusion

Financial development through liberalization and integration can play a significant part in improving economic growth and reducing income inequality across nations. Building on well examined natural experiments in the U.S. and India, the establishment of the Single

European Market through a banking passport, which enables European banks to freely branch and do business in other member states of the European Union, offers an additional opportunity to empirically analyze the effects of financial integration. We do not rely on specific opening dates of banks in other member states, rather than on a fundamental change in the competitive environment of European financial markets. Although there are other political and economic processes involved during the way of a country to become a member of the EU which might affect growth and inequality, our identification strategy uses a set of control variables and fixed effects to filter out the actual effects of financial development.

We show that financial development increases economic growth or wealth in the European Union and that especially less-developed nations and the bottom income groups gain from free financial markets. Additionally, less developed nations benefit on the labor market and can put more people into work. The positive effects can then actually be attributed to financial integration, since a subsample of only countries that entered the EU before 1993 confirms our results. Thus, countries actually benefit from financial development and not just from the European integration in general. By using a difference-in-difference analysis, we find support for the supply-leading hypothesis of financial development that economic agents gain from better loan supply and a more efficient credit allocation. Furthermore, we contribute to previous works, that show benefits for firms and entrepreneurs from financial integration on a microeconomic level. These results are robust to several different specifications. Of course, our results are limited to Europe and, therefore, cannot offer any final conclusions for other countries. However, as said before, the results are in line with previous findings for other samples of nations.

Our results paint a fairly positive picture of European expansion and the further integration of the European financial market. However, it could also be possible that the EU is experiencing a form of bubble, especially in Eastern Europe. During good economic times, a lot of money is flowing into the new member states of the Union, improving growth and inequality in these countries. However, if economic prospects change and become worse, capital could also flow out of these regions and leave them in a worse state than before as mentioned in the existing literature on "too much finance" (e.g., in Capelle-Blancard & Labonne (2016) or Beck et al. (2013)) or for the specific case of Eastern European countries (e.g., in Blažek & Hejnova (2020) or Gal & Schmidt (2017)).

Another point to consider might be that financial integration is only beneficial up to a certain point. While more financial access boosts economic development in the short run, economies could be restricted by financial literacy or institutional factors in how they utilize financial development in the long run. Such developments would also have severe consequences on the EU as a whole which is struggling with new and old political challenges that test solidarity across members such as the major influx of refugees in 2015, the Brexit, or the aftermath of the Covid-19-pandemic. Capital flows spurred by financial

development could create many jobs in the short run but leave whole generations behind if economic tides change.

Further research should, therefore, look into the course of financial development and these capital flows and might guide further political actions. Additionally, further research should also look at the European microeconomic level. Effects of financial integration on European firms and consumers would be very interesting and would complete our understanding of the works and channels of financial development.

B.8 Appendix Chapter B

Table B.10: Coefficients Corrected for Multicollinearity

	Full sample	Inequality		Eco. development		Unemployment	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(A) Economic Growth							
SBL	0.328 *** (0.028)	0.459 *** (0.037)	0.177 *** (0.043)	0.085 (0.058)	0.135 *** (0.044)	0.311 *** (0.037)	0.323 *** (0.044)
Gini	0.011 *** (0.002)	0.011 *** (0.004)	0.016 *** (0.005)	-0.004 * (0.002)	0.007 ** (0.003)	0.002 (0.003)	0.015 *** (0.003)
(B) Income Inequality							
SBL	-1.391 ** (0.547)	0.814 (0.556)	-1.935 *** (0.533)	1.064 (1.578)	-0.076 (0.872)	-1.010 (0.707)	-1.108 (0.908)
GDPpc	-0.0001 *** (0.00002)	-0.0001 *** (0.00003)	-0.00001 (0.00002)	-0.00004 * (0.00002)	-0.0002 (0.0001)	-0.0002 *** (0.0001)	-0.00004 (0.00003)
(C) Unemployment							
SBL	-1.214 ** (0.534)	-3.276 *** (0.863)	1.341 ** (0.562)	0.745 (1.737)	-2.060 ** (0.860)	-1.644 ** (0.819)	-0.547 (0.377)
GDPpc	-0.0001 *** (0.00002)	-0.0001 *** (0.00004)	0.000001 (0.00001)	-0.0001 *** (0.00002)	-0.0001 (0.0001)	-0.0002 *** (0.0001)	-0.00004 *** (0.00001)
Gini	0.092 ** (0.039)	0.291 *** (0.089)	0.213 *** (0.064)	0.178 *** (0.064)	0.077 ** (0.059)	0.025 (0.071)	0.067 *** (0.024)
Observations	703	376	327	345	358	333	370
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES

All regressions are done with fixed effects within regressions using country and year-fixed effects. The dependent variables are the logarithm of GDP per capita in panel (A), the Gini coefficient in panel (B), and the unemployment rate in panel (C), while the Gini coefficient, GDP per capita, trade and government consumption are used as control variables. In comparison to the regressions in the main part, secondary school enrollment and domestic credit to the private sector are excluded due to multicollinearity. Column (1) uses the whole sample. Column (2) reports results for countries with a Gini above the average, while column (3) does so for countries below the average. Column (4) gives the results for countries with a GDP p.c. above the average, while column (5) reports results for countries below the average. Column (6) gives results for the subsample of countries with above average unemployment, while column (7) gives the results for below average unemployment countries. ***, **, * represent significance at the 1, 5, 10% level respectively. Standard errors are in parentheses.

C The ATM Around the Corner - How Financial Development, Access, and Integration Influence Economic Growth and Inequality

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Abstract

The macroeconomic analysis of income inequality often rests on common driving factors such as globalization, demography, technological progress, or human capital accumulation while financial development and the structure of the financial sector are overlooked. However, well-developed and decentralized financial systems are widely spread across an economy with high numbers of bank branches and are readily accessible for economic agents. By pooling savings and acting as delegated monitors, banks improve the credit allocation on a microeconomic level in such a way, that even people without an initial endowment of wealth can overcome financing. By means of system GMM regressions, we use a worldwide and micro-based data set to show that financial development and liberalization through a higher number of ATMs, bank accounts, and bank branches increase economic growth and reduce income inequality. Especially in the short-run, lower parts of the income distribution benefit from such financial development.

Keywords: Financial Development, Financial Liberalization, Economic Growth, Income Inequality

JEL Classifications: D63, E42, E44, G21, O11, O16, O42, O44

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C.1 Introduction

Recent political events, such as the elections in Germany and across Europe, the electoral victory of President Trump in the U.S., and the Brexit referendum in the UK show the importance of inequality across and within nations. Economically weaker regions within nations suffer from unequal and lower economic growth and incomes and as a result question political elites. As studies by, e.g. the OECD (2011), show, income inequality increased for many countries over the last decades. The ongoing COVID-19-pandemic will probably increase inequality even further. If previous major epidemics of this century are any indicator, especially the employment prospects of people with low education will be hurt and the gap between top and bottom incomes might widen (Furceri et al. 2020).

Besides the often mentioned driving factors behind inequality like globalization, demography, technological progress, or the different accumulation of human capital (Barro 1996, Milanovic 2016) financial development and the structure of the financial sector was long overlooked. Robert Lucas (1988) initially dismissed finance as an "over-stressed" determinant of economic growth. Miller (1998) instead thought of finance and its contribution to economic growth as "too obvious for serious discussion". Schumpeter (1969) or McKinnon (1973) reject the argument that the relationship between finance and growth can be ignored without substantially limiting our understanding of economic growth. Hence, research and further understanding of the role of finance in the determination of economic growth will have important policy implications and shape future policy decisions.

So far, the economic analyses of inequality mostly rests on macroeconomic variables and is often performed for a single country or small samples. However, increased financial access and development work for a significant part on microeconomic levels. Well developed and decentralized financial systems are widely spread across an economy with a high number of bank branches and are readily accessible for economic agents. By pooling savings and acting as delegated monitors, banks improve the credit allocation in such a way that even people without an initial endowment of wealth can overcome financing restrictions and achieve their entrepreneurial ambitions.

The question is then, if causality runs from financial sector development to inequality or from inequality to financial development. To investigate the effects of financial development and liberalization on economic growth and inequality and the issue of potential reverse causality, I employ a specifically micro-based set of indicators of financial development like the number of bank accounts, branches, or ATMs. By that, I add to the understanding on how financial development and integration influences growth and inequality. By looking at the mere physical possibilities of economic agents to use financial services and to interact with banks, the very personal effects of financial integration are investigated. In my empirical analysis, I use cross-sectional OLS regressions to cap-

ture long-run effects. Fixed-effects panel regressions complement this procedure for the short-run dynamics. With regards to causality, I employ a system GMM estimation to support the supply-leading hypothesis of financial development causing economic growth and reducing income inequality.

The empirical findings show that financial development significantly improves economic growth for my sample of nations. With regards to the effects of financial development on inequality, the short-run dynamics show inequality alleviating effects, while in the long-run, financial development and liberalization might widen the income gap. Especially the results for the top and bottom 20% of the income distribution show that a more developed financial system positively affects lower incomes. An improved access to financing opportunities helps poorer people to achieve entrepreneurial ambitions and to move up the income ladder.

This paper will progress as follows: Chapter C.2 gives an overview of the existing literature on the finance-growth- and finance-inequality-nexus. I will also discuss theoretical considerations for the role of banks and financial institutions in economic growth and inequality. Chapter C.3 presents my hypotheses to be tested in the later econometric analysis. My data is presented in Chapter C.4, while chapter C.5 gives an intuition for the OLS, panel, and GMM regression methodology. Chapter C.6 shows the results, while Chapter C.7 concludes.

C.2 Literature Review

The major contribution of banks and the financial system in general is the amelioration of market frictions. Financial systems influence the allocation of resources in the economy (Bodie & Merton 1998), especially capital. By improving the acquisition of information about firms and their managers or creating financial contracts that make investors more confident that they will get their money back, banks will likely influence the allocation of credit and savings (Levine 2005). Not least the maturity transformation of short-term deposits to long-run loans and investments by banks alter the allocation of capital so that entrepreneurs with little own capital can still pursue their business and enterprises (Hellwig 2009). Banks act as delegated monitors, by pooling funds and taking up the task of monitoring borrowers (Diamond 1984, 1996). Thus, not every investor has to do the monitoring on herself and transaction costs are reduced, while capital scarce entrepreneurs have reduced financing or capital barriers. Reduced barriers to financing than leads to better growth prospects what is of great importance, since economic growth raises the wealth and well-being of nations and it would possibly help low-income countries narrow their income gap compared to high-income countries (Ranjbar & Rassekh 2017).

Thus, the financial system provides the following functions: the production of information and allocation of capital (Boyd & Prescott 1986, Boot et al. 1993, Holmström

& Tirole 1993, Galor & Zeira 1993, Levine 2005), the monitoring of firms and exerting corporate governance (Jensen & Murphy 1990, Boyd & Smith 1992), risk amelioration (An et al. 2008, Acemoglu & Zilibotti 1997), and the pooling of savings (Sirri & Tufano 1995, Diamond 1984, 1996). These functions and how well they operate determine the savings and investment decisions in an economy and, hence, economic growth.

The literature on relationship lending and regional banking systems further supports this notion that well-developed financial systems and wide-spread access to financial services are important for economic development. The model by Stein (2002) proves that a decentralized banking system (as in, e.g., Germany) is better in analyzing and gathering soft information. Small and geographically close banks are especially important for small and medium sized firms (Alessandrini et al. 2009) while large banks tend to reduce loan volumes for informationally opaque firms (Berger et al. 2005). Close banking relationships develop over long time periods and by that improve the screening capabilities of banks (Boot & Thakor 2000, Elsas 2005) and by reducing transaction costs (Petersen & Rajan 1994, Elsas & Krahnen 1998, Cotugno et al. 2013). Burghof et al. (2020) show the positive effects of a decentralized banking system on growth and inequality for a sample of German, Austrian, French, Italian, and Spanish NUTS 2-regions.

Hakenes & Schnabel (2010) theoretically argue for a rationale for regional public banks. With only big banks focusing on hard information, they predict a capital drain from underdeveloped or rural areas to richer regions. This would reduce the access to finance in this poorer regions even more and harm the economic opportunities of the people living there. As will be shown later, the poor disproportionately benefit from financial development and access, at least for the short run. But if the necessary financial institutions are missing in these regions, people will also miss these opportunities and a catching up process to the developed regions will be far more difficult.

The crucial point for growth is now whether the economy has a well-functioning financial system at all. In this sense, finance can shape the gap between the rich and the poor and how this gap persists across generations (Demirgüç-Kunt & Levine 2009). This might work through the extensive margin by increasing the availability of financial services to people who did not have these opportunities due to prices and credit constraints. Financial development expands the range of opportunities of disadvantaged people and reduces the persistence of inter-generational relative incomes. The other way is the intensive margin, in which the rich disproportionately profit from enhanced financial services, since they already had access to them. This would widen inequality and increase differences in economic opportunity (Greenwood & Jovanovic 1990, Demirgüç-Kunt & Levine 2009).

Galor & Zeira (1993) develop a model that shows, that with fixed costs associated with human capital accumulation, self-financed investment in education is only feasible for rich dynasties, so that financial market frictions keep the poor disproportionately more from accumulating education (Hanushek & Woessmann 2012). When the distribution

of initial wealth is highly skewed, only few will accumulate human capital, what slows growth, and deepens inter-generational inequality. As the financial system improves, even the poor can borrow and invest in human capital, what increases growth and reduces income inequality. The initial distribution of wealth, therefore, plays a crucial role for the development of the economy. Galor & Moav (2004) consider both human and physical capital. In the early stages of development, inequality has a positive effect on growth, since it channels resources toward individuals with a higher marginal propensity to save which increases with income. During this stage, growth-enhancing financial development will also boost inequality. In the later stages of development, wide spread human capital is essential for growth. The poor would like to borrow to finance their education but are prohibited by borrowing constraints. Thus, investment opportunities become a function of dynastic assets constrained on parental wealth, what in turn will foster persistent inequality (McKenzie & Woodruff 2006, Townsend & Ueda 2006, Piketty 2000).¹

To conclude the theoretical discussion, the question of the direction of causality has to be answered. So far, we have argued in favor of a *supply-leading* hypothesis. A more developed financial system and banking system influences the growth path of an economy and ultimately inequality within this economy. This supply-leading hypothesis is contrasted by the *demand following* view² of, e.g., Robinson (1952), which states that a growing economy has a higher demand for output which necessitates more investments and financial services to meet this demand. I reject this second view, since the financial systems which serve as explanatory variables in our analysis have been established long before and thus precede the observations of my dependent variables. Furthermore, to establish robustness, I employ a system GMM estimation to circumvent any concerns of reverse causality.

C.3 Hypotheses

For the following empirical analysis, I develop three hypotheses to be tested which are based on the above mentioned theoretical considerations. The first deals with financial development and economic growth and follows the seminal work by Goldsmith (1969) and King & Levine (1993). They present evidence in favor of the view that improved financial services stimulate economic growth by positively affecting capital accumulation and by improving the efficiency of capital allocation. I argue the same way and build on their findings with a more micro-oriented set of control variables. Better and more wide-spread access to financial services through more accessible bank branches, accounts and ATMs

¹The relationship between financial development and inequality can then take on the form of an *inequality-widening* hypothesis (Clarke et al. 2006), an *inequality-narrowing* hypothesis (Galor & Zeira 1993, Banerjee & Newman 1993) or an *inverted U-shape* (Greenwood & Jovanovic 1990).

²For completion, there are also the *feedback* hypothesis in which causality runs both ways, and the *neutrality* hypothesis in which financial development and economic growth are seen as independent (Puent-Ajovín & Sanso-Navarro 2015, Pradhan et al. 2017).

allow personal loans to be taken out with ease. In combination with a credit card or overdraft option on the bank account, short-term capital is readily available for entrepreneurs to start and finance their business. ATMs further increase financial access in addition to bank branches, since credit and liquidity is available at more places independent of opening hours and across different banks.³ Especially for young entrepreneurs this quick and simple access to financing could be important. Furthermore, in developing countries the availability of ATMs might be higher than for bank branches, which might be only concentrated in urban areas. The wider availability of ATMs and, thus, the potential access to credit across banks further reduces financial barriers. Through increased access, these measures of financial development or liberalization capture the impact of financial development on ordinary people rather than broad macro-based variables such as domestic credit to the private sector (Mookerjee & Kalipioni 2010, Mundaca 2009). The first hypothesis is, thus,

H1: A more developed financial sector increases economic growth in the respective economies.

The second hypothesis follows the work by Beck et al. (2007) who show that financial development reduces inequality, exerts a disproportionately positive effect on the relatively poor, and is associated with faster poverty alleviation. This study also presents evidence on the question of causality. Financial development might reduce inequality or lower inequality might increase the demand and political pressure for more and more efficient financial services. Tan & Law (2012) also find that financial deepening seems to significantly reduce inequality what supports the inequality-narrowing hypothesis. It also shows that inequality responds to different types of financial development. However, these studies only use private credit and liquid liabilities relative to GDP as well as stock market indicators as measures for financial development. I will add to this with our more micro-oriented data set. Thus, the second hypothesis is

H2: A more developed financial sector reduces income inequality in the respective economies and narrows the income gap.

It has already been stated that unequal access to financial services lowers economic growth and increases inequality. However, regulatory constraints might prohibit banks from opening branches in a certain region or even a foreign country (Claessens & Perotti 2007, Dreher & Gaston 2008) what then again increases financial constraints and barriers. Burghof & Gehrung (2021) show that the financial integration and reduction of financing constraints of the European Union through the Single Market Initiative in fact reduced the gap between top and bottom incomes while massively increasing economic growth.

³An economic agent may very well have his bank account at one bank but withdraws from ATMs at other banks.

Examples from bank branch deregulation in the U.S. (Beck et al. 2010) or foreign bank entry in India (Banerjee & Duflo 2014, Ang 2010, Gormley 2010, Burgess & Pande 2005) point at similar results. I argue that by further integrating and developing a financial system, financing barriers are reduced, more people gain access to capital and can follow their entrepreneurial ambitions. By that, their incomes improve and inequality is going down. The third hypothesis is, thus,

H3: Financial integration improves the access to credit and by that reduces income inequality in an economy.

C.4 Data

The data for the following regressions stems from the World Development Indicators data bank of the World Bank and the Global Financial Development data set by Demirgüç-Kunt et al. (2012). Similarly to the studies given above, indicators for financial development, stock market development, and financial liberalization are used to explain economic growth and income inequality.

Financial development is given by domestic credit to the private sector (DCPS) and domestic credit provided by the financial sector (DCFS), both in percent of the GDP. To relate the results more to the banking sector, domestic credit to the private sector by banks in percent of GDP was used alternatively. Furthermore, to measure the access people have to the financial sector and its services, the number of ATMs per 100,000 adults, bank accounts per 1,000 adults, and bank branches per 100,000 adults were used as indicators. This stresses the aforementioned microeconomic scope of the analysis. Bank branches and accounts were already used previously in the literature, by e.g. Honohan (2008) or Mookerjee & Kalipioni (2010), while ATMs is a quite novel indicator of financial access and deepening. The prevalence of bank branches and accounts shows the possibility for the population to have access to financial intermediation through a transactions account. By high minimum requirements to open an account or high costs of transportation to reach a bank branch, some people might completely be shut off from economic and financial life and face even more material extra costs from not having an account (Honohan 2008). They are then severely hindered in realizing their economic opportunities or gaining their efficient amount of education what might reduce incomes and increase inequality. Additionally, accounts and branches are also a more micro focused set of indicators instead of the macroeconomic variables of private credit, and by that more closely capture the impact of financial access for the individual economic agent (Mookerjee & Kalipioni 2010). The number of ATMs adds to this measure of financial access, since it is even closer to different geographical regions and by that measures the extent to which the banking sector is spread across a country. It also indicates whether the economy has reached a certain point of development from which it now can benefit

from further development. A sufficient and working network of ATMs and bank branches could resemble the thresholds of financial development mentioned by Tan & Law (2012) which are necessary for a positive impact of further finance. An additional indicator of financial access is given by the percent of people in the sample who are older than 15 years and have a credit or debit card.

Another point for consideration is the increasing relevance of online payment systems and banking services, as well as the rise of direct banks. One could argue, that actual bank branches and ATMs are not important anymore for accessing financial services. This might be true to some degree, but nevertheless, these indicators describe the spread and integration of a financial system across the country on a micro-basis. Furthermore, large economies like, e.g., Germany, France, and the U.S. are very much decentralized with a large presence of smaller regional banks which also operate many branches (Ferri et al. 2014, Chiaramonte et al. 2015, Flögel & Gärtner 2018). Additionally, our data set is worldwide and includes less developed economies such as in Africa or Latin-America, where access to financial institutions is also of great importance. Access to (micro-)credits is much higher when banks actually run branches across the country. Lastly, our data set reaches far back into the past and, thus, also captures the effects of financial development before online services started to gain prominence.

Another point might be the geographical distribution of ATMs. They could possibly all be concentrated in the capital or in metropolitan areas. Naturally, more densely populated areas (with consequently more businesses and entrepreneurs) have more ATMs. However, de Groen et al. (2018) or Ogba et al. (2016) show that ATMs are accessible across all regions in developed nations such as Europe, but also in less-developed countries such as Nigeria. We can, therefore, assume that a higher number of ATMs proxies for more financial development and a higher penetration of financial development that reduces the distance to financial services.

Stock market development is then measured by the stock market capitalization in percent of the GDP and the stock market turnover ratio in percent of GDP, i.e., the number of traded stocks as a fraction of the total number of stocks.

Besides the indicators for the number of ATMs, accounts, and bank branches, which already measure some degree of financial liberalization, the bank concentration in percent and the percentage of foreign banks among all banks are used as additional measures.

The dependent variable of economic growth is given by the logarithm of real GDP per capita. Income inequality is given by the Gini coefficient. Since the Gini coefficient shows only little sensitivity to the tails of the income distribution, we further include the income shares of the lowest and highest 20% to identify different reactions to financial development at the two ends of the income distribution.

To control for the trade openness of an economy the sum of imports and exports relative to GDP is included, while economic instability is given by the inflation rate,

calculated with a GDP deflator. The channel of government spending is given by general government final consumption expenditure in percent of GDP. The effect of schooling is measured by secondary school enrollment.

The data is available for a global set of countries containing developed and less developed nations for the period of 1960 to 2014⁴. However, due to missing values and data limitations the number of observations might vary in the different regressions. For the general cross-sectional analysis the variables are averaged over the sample period. Some summary statistics are reported in Table C.12 in the Appendix. As one can see, the average Gini is around 40 and reaches from roughly 25 in Azerbaijan to about 62 in Namibia. Also interesting is that the domestic credit to the private sector ranges from practically non existing 1% to 159% in Hong Kong. For the domestic credit provided by the financial sector this looks similar, with the lower bound even being negative in the states of Micronesia or Botswana. The use of debit cards also seems to be far more common with up to 98% in Norway. By looking at bank concentration, which is defined as the assets of the three largest banks relative to the assets of all banks, one can see that some nations have a very decentralized banking sector like the U.S. while in some countries like Chad or Samoa, the three largest banks hold all the business. The presence of foreign banks also differs widely across nations. A last point is that government consumption seems important for some countries such as Bangladesh where it is almost 100% of GDP.

The correlation matrix is not reported due to space restrictions. GDP per capita and the Gini coefficient are highly correlated with other variables in the data set as one would expect, since these are the main dependent variables. The same holds for the highest and lowest 20% of the income distribution. Besides that, the variables for financial development sometimes show correlation coefficients above 0.3 between each other. This could hint at the fact, that these variables capture the effects of financial development simultaneously.

C.5 Methodology

With the described data the following regression equations will be estimated:

$$\begin{aligned} \ln GDP_{c,t} = & \beta_0 + \beta_1 \mathbf{FINANCE}_{c,t} + \beta_2 \mathbf{GINI}_{c,t} + \beta_3 \mathbf{TRADE}_{c,t} + \beta_4 \mathbf{INF}_{c,t} \\ & + \beta_5 \mathbf{GOV}_{c,t} + \beta_6 \mathbf{SCHOOL}_{c,t} + \epsilon_{c,t} \end{aligned}$$

and

⁴Unfortunately, the World Bank does not offer all included variables for more recent years.

$$GINI_{c,t} = \beta_0 + \beta_1 \mathbf{FINANCE}_{c,t} + \beta_2 GDP_{c,t} + \beta_3 TRADE_{c,t} \\ + \beta_4 INF_{c,t} + \beta_5 GOV_{c,t} + \beta_6 SCHOOL_{c,t} + \epsilon_{c,t}.$$

$\ln GDP_{c,t}$ gives the dependent variable of the growth rate of real GDP per capita computed with logarithms for each country c in time period t . $\mathbf{FINANCE}_{c,t}$ then gives the different indicators for financial development, stock market development, or financial liberalization. The remaining variables indicate the controls for income inequality, trade openness, inflation, government consumption, and secondary school enrollment. Inequality, measured by the Gini coefficient, is also included to investigate the effect of higher inequality on economic growth and to build the bridge between economic growth and inequality. The second equation is essentially the same, but uses the Gini coefficient or income shares as dependent variables, while using GDP per capita as an additional control variable, given by $GDP_{c,t}$.

The baseline regressions will be done using OLS. However, the data includes a number of outliers which might distort the least squares estimate and makes them unreliable. An example for a regression undertaken later is given in Figure C.1 in the Appendix. As one can see there are many atypical observations, such as Georgia, Angola, Nicaragua, or Congo. Alternatively to robust standard errors, a procedure is used as a robustness check, which assigns smaller weights to those outliers in the final regression (Verardi & Croux 2009).

However, a purely cross-sectional analysis has some drawbacks. Causality cannot clearly be identified and by averaging the data over long periods, some dynamics in the data get lost. That is why also panel techniques will be used in the following regressions. Cross-section analyses can be interpreted as long-run behaviors, while dynamic panel models give additional insights into the short- and medium-run, due to their inclusion of the time series dimension. The aforementioned regression equations will then be estimated using a standard fixed-effects panel model. By including fixed-effects, the effect of time-invariant characteristics within the data (such as intrinsic opinions towards banking by the people or the degree of risk aversion towards using financial services) are eliminated and the results are unbiased (Angrist & Pischke 2009). According to the test by Hausman (1978), the use of fixed-effects models is appropriate.

A third panel technique is used, which has already been motivated before in Beck et al. (2007) and Tan & Law (2012) to correct for potential heteroskedasticity. The procedure by Arellano & Bond (1991) transforms all regressors by means of differencing to build a system of the original and transformed equation to be estimated by the General Method of Moments by Hansen (1982) and White (1982). GMM is used when a maximum likelihood estimation needs nonlinear optimization (Wooldridge 2010) and in cooperation with the

system of original and differenced equations leads to a higher number of instruments and increased efficiency. With OLS or standard two-stage least squares estimation to implement instruments and resolve the issues of endogeneity or reverse causation, it is assumed that the regressors or instruments are orthogonal to the error term, i.e. the moments of regressors and error term are zero. There arises a problem, when there are more instruments than regressors, thus there would be more equations than unknowns and the system of equations cannot be solved. This means that in case of heteroskedasticity and such a relation of needed instruments and explanatory variables, the GMM estimator is better suited than standard instrumental variables estimations (Baum et al. 2003). Since it is hard to find really suitable ones, with system GMM, instruments can be drawn from within the data by using lags of the dependent and other potentially endogenous variables (Roodman 2009). As already discussed above for the later results several tests have to be fulfilled for valid GMM estimates. The test for autocorrelation of order one has to be rejected, while autocorrelation of order two cannot be rejected, since the AR(2) test of the differenced residuals has to find AR(1) characteristics in the underlying level equations. Furthermore, there are the tests of overidentification and validity of instruments, where the value of the test statistic by Sargan (1958) has to be small and for Hansen⁵ to be larger.⁶

C.6 Results and Discussion

The first empirical analysis is with regard to the effects of financial development on economic growth. For these regressions the dependent variable is the growth rate of real GDP per capita which will be regressed on different indicators of financial development and stock market development.

The cross-section results obtained from OLS regressions are reported in Table C.13 in the Appendix. In this and all following regressions, the before mentioned set of control variables is used but their coefficients are not reported due to space restrictions. They confirm previous empirical findings that financial development enhances economic growth measured by the growth rate of GDP per capita. The coefficients for domestic credit to the private sector and provided by the financial sector are both positive and statistically significant. Also economically these results are significant. Due to the log-level specification of the regression, the results can be interpreted as semi-elasticities. Thus, e.g. an increase of one percent of domestic credit to the private sector relative to GDP would

⁵If the Hansen test would not be included we would expect higher values for the Sargan test and to not reject its null hypothesis of homoskedasticity like, e.g., in Beck et al. (2007) or Tan & Law (2012). If the null hypothesis could be rejected the instruments used would have to be reconsidered, since not all would fulfill the exogeneity requirement (Wooldridge 2010).

⁶The test procedure for valid instruments by Hansen is also included, since the test by Sargan could possibly be inconsistent and Hansen gives more robust results for potential over-identification. However, both tests suffer when there is a large number of instruments (Roodman 2009).

Table C.1: Financial development, stock market development and economic growth: panel regressions

	(1)	(2)	(3)	(4)
Log GDP p.c.	FE	FE	FE	FE
Dom. credit to private sector	0.004*** (0.0003)			
Dom. credit by financial sector		0.001*** (0.0003)		
Stock market capitalization			0.002*** (0.0003)	
Stock market turnover				-0.0001 (0.0001)
Gini coefficient	-0.008*** (0.0018)	-0.007*** (0.0019)	-0.005*** (0.0021)	-0.008*** (0.0022)
Observations	910	912	700	692
Overall R^2	0.62	0.56	0.47	0.33

All regressions are done with fixed-effects GLS estimations. The dependent variable is the logarithm of real GDP per capita. The Gini coefficient, trade as the sum of exports and imports relative to GDP, the inflation rate, general government final consumption expenditure in percent of GDP, and secondary school enrollment are used as control variables. ***, **, * represent significance at the 1, 5, 10% level respectively. Cluster robust standard errors are in parentheses.

boost economic growth by 1.8% (roughly 1% for credit by the financial sector). The control variables also show the expected signs. For robustness checks, alternative specifications with domestic credit to the private sector by banks or taking domestic credit to the private sector and by the financial sector jointly into account do not change the results. For stock market development, the market capitalization increases GDP growth significantly, while the turnover ratio on the stock market is not significant.

As mentioned before, we further check robustness by using regressions with weighted outliers. The results for financial development and its affect on economic growth do not change qualitatively. An interesting point is, that the joint inclusion of DCPS and DCFS renders credit by the financial sector negative. This could be interpreted as an importance of credit from other sources than financial intermediaries for realizing investment projects by the private sector.

For the fixed-effects panel estimations reported in Table C.1, the hypothesis of a positive relationship between financial development and economic growth also holds. The coefficients for DCPS and DCFS are both positive and statistically, as well as, economically significant. Stock market capitalization is also positive and significant, while on the contrary the turnover ratio is not statistically significant. As mentioned above, cross-sectional data reflects the long run, since the data is averaged over the whole sample period, while panel data captures the short- and medium-run dynamics due to its inclusion of the time dimension. The control variables show again their expected signs. These

results also pass robustness checks with alternative specifications (joint inclusion of DCPS and DCFS).

Table C.2 then gives the results for the system GMM with the logarithm of GDP per capita as dependent variable and the inclusion of lagged values of GDP, DCPS, and DCFS, as well as, the stock market indicators, as instruments. The indicator variables are also lagged similarly to the specifications by Tan & Law (2012), since they are most likely not exogenous. Additionally, a crisis dummy, which is one if a financial crisis occurred in that year in the respective country and zero otherwise, is included, since that significantly improves the GMM estimation (Roodman 2009). Lastly, the set of control variables from before is not included, since that would have increased the number of instruments relative to the number of observations in such a way that the over-identification test would have become unreliable.

Table C.2: Financial development, stock market development and economic growth: system GMM regressions

	(1)	(2)	(3)	(4)	(5)	(6)
Log GDP p.c.	GMM	GMM	GMM	GMM	GMM	GMM
Lag log GDP per capita	1.113*** (0.0396)	1.098*** (0.0254)	1.121*** (0.0432)	0.931*** (0.0330)	0.963*** (0.0207)	0.920*** (0.0361)
Lag dom. credit to private sector	-0.003*** (0.0011)		0.0004*** (0.0002)			
Lag dom. credit by financial sector		-0.002*** (0.0005)	0.004*** (0.0012)			
Stock market capitalization				0.001* (0.0003)		0.001* (0.0003)
Stock market turnover					0.0001 (0.0002)	0.0001 (0.0002)
Crises dummy	-0.008 (0.0129)	-0.014 (0.0130)	-0.008 (0.0135)	-0.010 (0.0141)	-0.016 (0.0141)	-0.011 (0.0148)
Constant	-0.752*** (0.2754)	-0.679*** (0.1823)	-0.814*** (0.3015)	0.611** (0.2784)	0.348** (0.1775)	0.698** (0.3043)
Autocorr. of order 1	0.000	0.056	0.000	0.000	0.000	0.000
Autocorr. of order 2	0.005	0.964	0.010	0.005	0.020	0.021
Sargan test	0.000	0.000	0.000	0.000	0.000	0.000
Hansen test	0.367	0.347	0.386	0.197	0.060	0.271
Numb. of instruments	14	14	15	16	16	17
Observations	6,425	6,415	6,394	2,324	2,272	2,266

All regressions are done with system GMM estimation and the two-step estimator. The dependent variable is the logarithm of real GDP per capita. Furthermore, a crisis dummy is used as a control variable. ***, **, * represent significance at the 1, 5, 10% level respectively. Standard errors corrected for heteroskedasticity and autocorrelation are in parentheses.

The results show first the inclusion of just one indicator and in columns (3) and (6) the joint inclusion of financial and stock market development indicators. For DCPS and DCFS the one period lags have negative signs and would, thus, slow down economic growth. For their joint inclusion, credit by the financial sector would enter the growth nexus positively. The stock market indicators show a positive and significant effect of stock market capitalization on economic growth, while turnover is insignificant. The crises dummy enters with the expected negative sign but is statistically insignificant. The statistics for the Sargan and Hansen tests for over-identification are in order, while the results for second order autocorrelation are rather weak.

The results for the system GMM do not find support for the previous estimations due to their different signs. For causality they give additional information due to the significance of the lagged estimates. Thus, there seems to be an effect which runs from financial development to economic growth. The results from the cross-section and panel estimation, on the contrary, are in line with the results from the literature and robust to several alternative specifications. Financial development seems to exert a positive effect on economic growth. Therefore, the first hypothesis is confirmed.

To establish the link between inequality and economic growth, the Gini coefficient was included as additional explanatory variable. For the cross-sectional data, it always enters insignificantly and is, therefore, not reported. For the panel and GMM estimations, however, it gives a lot of insights. In the panel estimations, it enters significantly with a negative sign, thus, higher inequality slows down economic growth (as predicted by e.g. Cingano (2014) or Milanovic (2016)). For the system GMM, the lagged values of the Gini coefficient are insignificant for financial sector development indicators and show the wrong sign but for stock market development they turn negative and significant. This gives some evidence for causality running from inequality to lower growth. The fact that the coefficient for the Gini becomes insignificant when looking at DCPS and DCFS might be due to the fact that both variables capture some degree of inequality and, thus, cancel out their effects partially. This could also explain the insignificance of the cross-sectional results, since there are a lot of control variables like schooling or trade openness which could already capture many of the differences in inequality explaining economic growth (Herzer & Vollmer 2012). Regarding causality, the results from the GMM estimations point at a causal relationship running from financial and stock market development to economic growth. Thus, there is a significant relation between inequality and growth as well as with financial development.

The next relationship to investigate is between financial development and income inequality. The dependent variable is the Gini coefficient which will be regressed on DCPS, DCFS, stock market capitalization, and stock market turnover. An additional control variable is GDP per capita to look again at the relationship between growth and inequality. The results for the standard OLS estimation are again given in Table C.14 in

the Appendix.

The positive coefficients of DCPS and DCFS indicate, that an increase in financial development would increase the value of the Gini coefficient and, thus, increase inequality. However, when DCFS is taken into account the results are insignificant. With the joint inclusion of both financial development indicators in column (3), the coefficient for credit granted by the financial sector becomes negative and would indicate a reduction in inequality. The results for stock market development are also ambiguous. The market capitalization increases inequality, while the turnover ratio would reduce it insignificantly. The signs of the control variables are as expected, while the significance of GDP underlines the strong link between economic growth and inequality as previously motivated. Alternative specifications with DCPS by banks, or the income shares of the lowest 20% does not change these findings.

So far, these results would be in contrast to previous research that financial development reduces inequality. However, by taking a look at the outlying behavior of the data in Figure C.2 in the Appendix one can see that there seems to be a big division between different groups of countries, which causes huge atypical observations.

Therefore, the countries are divided into having a developed financial sector or a under-developed financial sector. If the value of DCPS of a country is above the mean, it is categorized as financially developed and with DCPS below the mean it is under-developed. The results for developed and undeveloped countries obtained by weighted outliers regressions are reported in Tables C.3. The corresponding OLS regressions for the sub-samples are not reported due to space restrictions.

For *financially developed* countries the OLS results do not change by much. Only when taking DCPS and DCFS jointly into account, DCFS reduces inequality significantly. Stock market capitalization now enters also significantly and indicates an increase in inequality. With weighted outliers the inequality-reducing effect of credit by the financial sector becomes more prominent. It is significant for a single and joint inclusion and shows a negative sign. The stock market becomes insignificant again. The inequality reducing effect of credits granted by the financial sector could be interpreted as a higher demand for financial services in developed countries and stress the importance of the financial sector there. The stock market however seems not to impact the income distribution.⁷

For *financially less developed* countries, the regressions with weighted outliers show significance for all indicators of financial or stock market development. However, except for the stock market turnover ratio they seem to increase inequality, what could point in the direction of the findings by Ndikumana (2005). Financial deepening can be harmful for developing countries, if their financial sector is not equipped to gain from the potential

⁷This is in line with research by, e.g., Rioja & Valev (2014) who find that equity markets do not contribute to the capital accumulation or productivity growth in low-income countries. Arrondel et al. (2010) present evidence from France, that people with uncertain income do not participate in the stock market.

Table C.3: Financial development, stock market development, and income inequality: weighted outlier regressions

(A) Well-developed countries					
	(1)	(2)	(3)	(4)	(5)
Gini	Weighted outliers	Weighted outliers	Weighted outliers	Weighted outliers	Weighted outliers
Dom. credit to private sec.	-0.020 (0.0217)		0.047* (0.0271)		
Dom. credit by fin. sec.		-0.023* (0.0123)	-0.058*** (0.0197)		
Stock market capitalization				0.019 (0.0141)	
Stock market turnover					0.003 (0.0183)
(B) Under-developed countries					
Dom. credit to private sec.	0.190** (0.0941)		0.187** (0.0904)		
Dom. credit by fin. sec.		0.109* (0.0626)	0.005 (0.0459)		
Stock market capitalization				0.028** (0.0139)	
Stock market turnover					-0.042*** (0.0130)

Part (A) shows regressions with weighted outliers for countries with domestic credit to the private sector above the mean. Part (B) shows regressions with weighted outliers for countries with domestic credit to private sector below the mean. The dependent variable is the Gini coefficient. GDP per capita, trade as the sum of exports and imports relative to GDP, the inflation rate, general government final consumption expenditure in percent of GDP, and secondary school enrollment are used as control variables. ***, **, * represent significance at the 1, 5, 10% level respectively. Standard errors are in parentheses.

benefits. The findings also stress the importance of looking at different groups of countries at different stages in their economic development to see the possibly heterogeneous effects of financial development on inequality.

To gain more insights, we use the same panel approaches from before and report the results in Tables C.15 for the fixed-effects panel estimation and in Table C.4 for the system GMM. The results for the panel model are mostly statistically insignificant and are, therefore, reported in the Appendix. An interpretation for the significant inequality reducing effect of the turnover ratio in these regressions might be, that the more people trade on the stock market and can gain from investment opportunities and dividends, the lower inequality becomes.

The system GMM meanwhile, delivers far more meaningful results. The positive coefficients of the lagged Gini indicate that high inequality in the past results in higher inequality today. They also show that the lagged values of DCPS and DCFS also reduce inequality when taken into account separately. This is again a sign for causality

Table C.4: Financial development, stock market development and income inequality: system GMM regressions

	(1)	(2)	(3)	(4)	(5)	(6)
Gini	GMM	GMM	GMM	GMM	GMM	GMM
Lag Gini	0.584*** (0.1537)	0.581*** (0.1525)	0.580*** (0.1517)	0.515*** (0.1695)	0.668*** (0.0955)	0.656*** (0.1211)
Lag dom. credit to private sec.	-0.020** (0.0091)		-0.015 (0.01887)			
Lag dom. credit by fin. sec.		-0.017** (0.0078)	-0.003 (0.0218)			
Stock market capitalization				-0.020* (0.0110)		-0.013** (0.0062)
Stock market turnover					-0.010** (0.0038)	-0.007** (0.0036)
Crises dummy	-0.161 (0.5704)	0.042 (0.5230)	0.017 (0.4853)	-1.019 (0.6461)	-0.360 (0.4228)	-0.285 (0.4471)
Constant	16.653*** (6.2442)	16.817*** (6.2258)	16.885*** (6.1917)	18.399*** (6.5012)	12.337*** (3.5710)	13.198*** (4.6336)
Autocorr. of order 1	0.000	0.000	0.000	0.001	0.000	0.000
Autocorr. of order 2	0.038	0.035	0.036	0.078	0.056	0.069
Sargan test	0.089	0.107	0.103	0.021	0.049	0.030
Hansen test	0.203	0.210	0.212	0.165	0.333	0.272
Numb. of instruments	11	11	12	21	21	22
Observations	595	595	595	494	484	484

All regressions are done with system GMM estimation and the two-step estimator. The dependent variable is the Gini coefficient. Furthermore, a crisis dummy is used as a control variable. ***, **, * represent significance at the 1, 5, 10% level respectively. Standard errors corrected for heteroskedasticity and autocorrelation are in parentheses.

running from financial development to inequality, since the lagged value of the indicator significantly influences the dependent variable. For the stock market, capitalization and turnover reduce inequality, as well as in a joint specification of the two regressors. Second order autocorrelation is again not very strong, but Sargan's and Hansen's tests for validity of the instruments and over-identification give the wanted results.

In summary, the empirical findings from the previous literature for the positive relationship between financial development and inequality cannot fully be reproduced. The OLS and standard panel results rather point at inequality increasing effects of finance. However, the more sophisticated system GMM offers results in line with previous empirical work, that developments in the financial sector and on the stock market can reduce inequality and are more conclusive for causality concerns. The importance of the stock market for inequality is established and especially the turnover, which in a sense represents access to financial intermediation (since more people trade stocks relative to the absolute

number only if they have the possibility to trade) is decreasing inequality. Again, cross-sectional results might be more adequate for the long run, which replicates the possible harmful consequences of too much finance especially for developing countries as mentioned by Ndikumana (2005) and seen in the regressions with a sub-sample for financially less-developed countries. The short-run dynamics of the panel data and especially the GMM, however, point at an inequality alleviating effect. Therefore, the second hypothesis is also fulfilled at that point.

Interesting now is, how real financial liberalization in the form of wider access to financial services influences inequality. Therefore, we employ our micro-based data on the number of ATMs, accounts, and bank branches as additional explanatory variables. The econometric analysis will start with looking at financial liberalization and economic growth, since the strong link between inequality and growth has already been motivated. After that, regressions with the Gini coefficient as dependent variable will follow. The cross-sectional results with the logarithm of real GDP per capita as dependent variable are reported in Table C.5.

Table C.5: Financial liberalization and economic growth: OLS regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log GDP p.c.	OLS	OLS	OLS	OLS	OLS	OLS	OLS
ATM	0.020*** (0.0032)			0.028*** (0.0072)			
Accounts		0.001* (0.0004)		-0.00002 (0.0003)			
Branches			0.022*** (0.0060)	0.007 (0.0076)			
Credit cards					0.033*** (0.0043)		
Debit cards					0.017*** (0.0034)		
Bank conc.						-0.011* (0.0060)	
Foreign banks							0.002 (0.0031)
Gini coeff.	0.008 (0.0072)	0.030*** (0.0095)	0.007 (0.0083)	0.014 (0.0093)	0.021*** (0.0052)	0.013* (0.0072)	0.017** (0.0075)
Observations	143	84	145	83	129	132	117
R^2	0.73	0.82	0.86	0.69	0.56	0.87	0.85

All regressions are done with OLS estimation. The dependent variable is the logarithm of real GDP per capita. The Gini coefficient, trade as the sum of exports and imports relative to GDP, the inflation rate, general government final consumption expenditure in percent of GDP, and secondary school enrollment are used as control variables. ***, **, * represent significance at the 1, 5, 10% level respectively. Heteroskedasticity robust standard errors are in parentheses.

It is evident that increasing access to financial services through more ATMs, accounts, or bank branches increases the growth rate of GDP. Again the log-level interpretation

holds and the coefficient for ATMs can be interpreted as a 2% increase in GDP growth if the number of ATMs per 1,000 adults is increased by one. The coefficient for accounts, however, struggles with significance in the joint specification in column (4), as does branches. This insignificance could be due to laws such as in Germany, where everybody has the right to have a bank and checking account, independent of his economic standing. This access to financial services by law could eliminate any effect on growth. Additionally, the data for accounts has several missing values.

Also interesting is that the prevalence of credit and debit cards increases economic growth. Bank concentration, measured by the assets held by the three largest banks relative to the assets of all banks, seems to decrease economic growth. This is in line with the theoretical considerations that a decentralized, bank-based financial system might more effectively utilize soft information and relationship lending, resulting in a more efficient capital allocation and reduced financing barriers (Burghof et al. 2020). On the contrary, a situation where banking power lies in the hands of a few, is prone to monopolies and rent-seeking. This could be especially problematic for poor countries. Meanwhile, the share of foreign banks in a country seems to increase growth, but the coefficient is insignificant. Regressions with weighted outliers do not change these findings and are not reported due to space restrictions.

Table C.6: Financial liberalization and economic growth: panel regressions

Log GDP p.c.	(1) FE	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE	(7) FE
ATM	0.003*** (0.0003)			0.004*** (0.0006)			
Accounts		0.0002*** (0.00003)		0.0001*** (0.00003)			
Branches			0.001*** (0.0003)	0.0006* (0.0003)			
Credit cards					-0.001 (0.0077)		
Debit cards					0.005 (0.0049)		
Bank conc.						-0.003*** (0.0005)	
Foreign banks							0.008*** (0.0005)
Gini coeff.	-0.011*** (0.0018)	-0.016*** (0.0029)	-0.016*** (0.0019)	-0.009*** (0.0032)	-0.004 (0.0122)	-0.013*** (0.0021)	-0.010*** (0.0018)
Observations	555	232	570	210	78	754	758
Overall R^2	0.61	0.30	0.50	0.43	0.66	0.41	0.11

All regressions are done with fixed-effects GLS estimations. The dependent variable is the logarithm of real GDP per capita. The Gini coefficient, trade as the sum of exports and imports relative to GDP, the inflation rate, general government final consumption expenditure in percent of GDP, and secondary school enrollment are used as control variables. ***, **, * represent significance at the 1, 5, 10% level respectively. Cluster robust standard errors are in parentheses.

The panel estimation results reported in Table C.6 support these findings. Besides the coefficients for ATMs and bank branches, now also the estimate for bank accounts per 100,000 adults enters with high significance and with a positive sign. Credit and debit cards are still growth enhancing and significant, however, debit cards are not significant. This might be due to the significant coefficient of accounts and which are closely linked to debit cards. When opening an account, the customer also gets a debit card, thus, these two effects might be correlated. Bank concentration still enters negatively, while foreign banks are now significant. A higher share of foreign banks, and the increased competition for the entire banking sector through that, increases economic growth. Thus, in the short run, inequality hampers economic growth.

Table C.7: Financial liberalization and economic growth: system GMM regressions

	(1)	(2)	(3)	(4)	(5)	(6)
Log GDP p.c.	GMM	GMM	GMM	GMM	GMM	GMM
Lag Log GDP per capita	0.978*** (0.0141)	1.111*** (0.1882)	0.969*** (0.0178)	1.055*** (0.0356)	0.959*** (0.0119)	0.909*** (0.0256)
Lag ATM	-0.0002 (0.0003)			-0.0018** (0.0008)		
Lag Accounts		-0.0002 (0.0028)		-0.00001 (0.00003)		
Lag Branches			0.001 (0.0007)	-0.001 (0.0010)		
Lag Bank conc.					-0.001** (0.0003)	
Lag Foreign banks						-0.0003 (0.0004)
Lag Gini	-0.0002 (0.0005)	-0.003 (0.0028)	-0.002 (0.0012)	0.0002 (0.0009)	-0.003*** (0.0006)	-0.004*** (0.0009)
Crisis dummy	-0.028*** (0.0085)	0.021 (0.1012)	-0.008 (0.0105)	0.010 (0.0274)	0.002 (0.0144)	0.054** (0.0269)
Constant	0.069 (0.1222)	-0.576 (1.1869)	0.340* (0.1792)	-0.334 (0.2112)	0.514*** (0.1168)	0.9491*** (0.2293)
Autocorrelation order 1	0.000	0.102	0.000	0.091	0.000	0.003
Autocorrelation order 2	0.003	0.118	0.003	0.043	0.000	0.000
Sargan test	0.000	0.004	0.000	0.008	0.000	0.067
Hansen test	0.000	0.360	0.000	0.210	0.023	0.544
Numb. of instruments	15	15	15	17	12	12
Observations	462	186	485	156	745	787

All regressions are done with system GMM estimation and the two-step estimator. The dependent variable is the logarithm of GDP per capita. Furthermore, the lag of the Gini coefficient and a crisis dummy are used as control variables. ***, **, * represent significance at the 1, 5, 10% level respectively. Standard errors corrected for heteroskedasticity and autocorrelation are in parentheses.

The system GMM estimates in Table C.7 show negative effects of an increased number of ATMs per economy on economic growth. The sometimes significant coefficients for the lagged values of indicators of financial liberalization give additional evidence for a causal relationship running from financial development to economic growth. In summary the findings from the OLS and fixed-effects regressions are in line with previous literature that financial development and increased access to it boosts economic growth and complement the results for regressions with domestic credit and stock market indicators. Meanwhile the significance of indicators for financial liberalization in the GMM framework further supports the causal link running from financial development to economic growth. This further supports the first hypothesis.

The effects on income inequality with the Gini coefficient as dependent variable are then presented in Table C.16 in the Appendix for the standard OLS estimation. The coefficients indicate that financial liberalization measures increase inequality, except for the number of accounts and bank concentration, which enter with negative signs. Obviously, the data for the Gini coefficient is again associated with strong outlyingness. Thus, the sample is again split into well-developed countries with DCPS larger than the mean value and in under-developed if DCPS was below the mean. Weighted outliers were used in the least squares estimation. The estimates are given in Tables C.8.

For *financially well-developed* countries the results go in the same direction as the results for the whole cross-section sample. Accounts significantly reduce the Gini coefficient, while ATMs and branches have positive signs when they are significant. Bank concentration also enters with a negative sign, while foreign banks seem to increase inequality significantly for this sub-sample. The sub-sample of *under-developed* countries paints a similar picture. Overall the cross-sectional evidence seems to point at an inequality increasing relationship between financial development and economic growth. However, this might again only be true for the long run and, thus, panel estimates for the short-period dynamics are important. The fixed-effects estimates can be found in Table C.9.

The panel results show a quite different picture compared to the cross-sectional analysis. All indicators of financial liberalization or access enter significant with negative signs. I.e., the number of ATMs, bank accounts, and bank branches significantly reduce income inequality measured by the Gini coefficient for this sample. The number of credit cards would increase inequality but is insignificant, while debit cards are also inequality reducing. This seems intuitive, since credit cards lead to higher indebtedness of households and, thus, might increase inequality by hitting low-income households more severely. In the panel specification both bank concentration and the share of foreign banks also enter negatively but are insignificant. These results add to the findings of studies which previously used bank branches and accounts, while adding an even deeper microeconomic dimension of financial access with the significant coefficients for the number of ATMs. A wide-spread network of ATMs reduces the distance to financial services and access for

Table C.8: Financial liberalization and income inequality: weighted outlier regressions

	(A) Well-developed countries						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	WO	WO	WO	WO	WO	WO	WO
ATM	0.015** (0.0074)			0.219*** (0.0000)			
Accounts		-0.007*** (0.0004)		-0.007*** (0.0000)			
Branches			-0.013 (0.0159)	0.579*** (0.0000)			
Credit cards					-0.007 (0.0215)		
Debit cards					0.034 (0.0220)		
Bank conc.						-0.093*** (0.0142)	
Foreign banks							0.053*** (0.0099)
GDP p.c.	-0.0001*** (0.00003)	0.00002*** (0.00001)	-0.0001 (0.00005)	-0.004*** (0.0000)	-0.0001 (0.0001)	0.0001*** (0.00002)	-0.0001*** (0.00002)
	(B) Under-developed countries						
ATM	0.059 (0.0934)			0.463* (0.2598)			
Accounts		-0.004*** (0.0011)		-0.012* (0.0060)			
Branches			0.213** (0.1063)	0.249*** (0.0362)			
Credit cards					0.593 (0.6060)		
Debit cards					0.024 (0.0500)		
Bank conc.						-0.099* (0.0609)	
Foreign banks							-0.052 (0.0960)
GDP p.c.	0.001 (0.0007)	0.004*** (0.0009)	0.001 (0.0006)	0.0001 (0.0008)	0.0001 (0.0010)	0.001 (0.0011)	0.003 (0.0017)

Part (A) shows regressions with weighted outliers for countries with domestic credit to the private sector above the mean. Part (B) shows regressions with weighted outliers for countries with domestic credit to private sector below the mean. The dependent variable is the Gini coefficient. GDP per capita, trade as the sum of exports and imports relative to GDP, the inflation rate, general government final consumption expenditure in percent of GDP, and secondary school enrollment are used as control variables. ***, **, * represent significance at the 1, 5, 10% level respectively. Standard errors are in parentheses.

economic agents. By that, entrepreneurs can overcome financial barriers and reach an efficient capital allocation what ultimately closes the income gap. The system GMM results in Table C.17 in the Appendix confirm the inequality alleviating effect of more bank accounts and give support for causality running from financial development to inequality.

It is now interesting to look at different parts of the income distribution. Tables C.10

Table C.9: Financial liberalization and income inequality: fixed-effects regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gini	FE	FE	FE	FE	FE	FE	FE
ATM	-0.031*** (0.0072)			-0.070*** (0.0143)			
Accounts		-0.003*** (0.0009)		-0.002*** (0.0008)			
Branches			-0.025*** (0.0069)	-0.018** (0.0077)			
Credit cards					0.195 (0.1941)		
Debit cards					-0.220* (0.1079)		
Bank concentration						-0.005 (0.0086)	
Foreign banks							-0.016 (0.0109)
GDP p.c.	-0.0001 (0.0001)	-0.001*** (0.0003)	-0.0003*** (0.0001)	-0.0002 (0.0003)	-0.004 (0.0035)	-0.0002** (0.0001)	-0.0001 (0.0001)
Observations	555	232	570	210	78	754	758
Overall R^2	0.25	0.08	0.25	0.02	0.10	0.28	0.31

All regressions are done with fixed-effects GLS estimation. The dependent variable is the Gini coefficient. GDP per capita, trade as the sum of exports and imports relative to GDP, the inflation rate, general government final consumption expenditure in percent of GDP, and secondary school enrollment are used as control variables. ***, **, * represent significance at the 1, 5, 10% level respectively. Cluster robust standard errors are in parentheses.

and C.11 report cross-section and panel estimates for the income shares of the highest and lowest 20% as dependent variables, respectively.

The OLS results show that the highest incomes are not very affected by increased access to financial service, only ATMs and credit cards would significantly increase them in column (4) and (5). However, the lowest income shares are negatively effected by increased financial liberalization. ATMs, bank branches, credit, and debit cards enter significantly with negative signs, while only accounts are positive but with very small coefficients. The effects of bank concentration and foreign banks are insignificant for both dependent variables.

The panel estimates calculated with fixed-effects on the contrary show negative signs for the upper income classes for all indicators with high significance, while the lower income shares are positively affected by the number of ATMs, accounts, and bank branches on at least the 5% significance level. These results are confirmed by the GMM regressions in Table C.18 in the Appendix. The negative effects of bank accounts on the highest income shares and the positive effects for lower income shares are similarly given as for the standard panel regressions. Significant coefficients further stress the causal link running from financial liberalization to income shares.

It is evident, that there are big differences between the OLS cross-section results,

Table C.10: Financial liberalization and income shares: OLS regressions

	(A) Income share highest 20%						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS
ATM	0.027 (0.0188)			0.119** (0.0499)			
Accounts		-0.001 (0.0024)		-0.004 (0.0025)			
Branches			0.029 (0.0364)	0.091 (0.0704)			
Credit cards					0.114** (0.0539)		
Debit cards					0.024 (0.0317)		
Bank concentration						-0.028 (0.0314)	
Foreign banks							0.013 (0.0244)
Observations	142	84	144	83	129	131	117
R^2	0.27	0.12	0.27	0.22	0.30	0.29	0.30
	(B) Income share lowest 20%						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS
ATM	-0.012** (0.0053)			-0.035*** (0.0109)			
Accounts		0.0002 (0.0007)		0.001* (0.0006)			
Branches			-0.015 (0.0091)	-0.033* (0.0172)			
Credit cards					-0.045*** (0.0135)		
Debit cards					-0.008 (0.0086)		
Bank concentration						0.011 (0.0096)	
Foreign banks							-0.005 (0.0074)
Observations	142	84	144	83	129	131	117
R^2	0.18	0.07	0.18	0.21	0.22	0.19	0.19

All regressions are done with OLS. The dependent variable is the income share of the highest 20% in part (A) and the income share of the lowest 20% in part (B). GDP per capita, trade as the sum of exports and imports relative to GDP, the inflation rate, general government final consumption expenditure in percent of GDP, and secondary school enrollment are used as control variables. ***, **, * represent significance at the 1, 5, 10% level respectively. Heteroskedasticity robust standard errors are in parentheses.

which predict an increase in income inequality due to financial liberalization, and the panel estimates, which speak for a inequality reduction. Again, this might be due to the rather long-run effects captured by cross-sectional results, which are based on averages

Table C.11: Financial liberalization and income shares: fixed-effects regressions

	(A) Income share highest 20%						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FE	FE	FE	FE	FE	FE	FE
ATM	-0.024*** (0.0058)			-0.054 (0.000)***			
Accounts		-0.003*** (0.0007)		-0.002 (0.002)***			
Branches			-0.022*** (0.0056)	-0.017 (0.008)***			
Credit cards					0.180 (0.1672)		
Debit cards					-0.185* (0.0929)		
Bank concentration						-0.005 (0.0072)	
Foreign banks							-0.010 (0.0091)
Observations	555	232	570	210	78	754	758
Overall R^2	0.27	0.10	0.27	0.04	0.10	0.30	0.32
	(B) Income share lowest 20%						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FE	FE	FE	FE	FE	FE	FE
ATM	0.006*** (0.0020)			0.018*** (0.0036)			
Accounts		0.001*** (0.0002)		0.001** (0.0002)			
Branches			0.004** (0.0018)	0.001 (0.0019)			
Credit cards					-0.027 (0.0477)		
Debit cards					0.048 (0.0265)		
Bank concentration						0.001 (0.0022)	
Foreign banks							0.004 (0.0027)
Observations	555	232	570	210	78	754	758
Overall R^2	0.16	0.03	0.15	0.01	0.06	0.19	0.20

All regressions are done with fixed-effects GLS estimations. The dependent variable is the income share of the highest 20% in part (A) and the income share of the lowest 20% in part (B). GDP per capita, trade as the sum of exports and imports relative to GDP, the inflation rate, general government final consumption expenditure in percent of GDP, and secondary school enrollment are used as control variables. ***, **, * represent significance at the 1, 5, 10% level respectively. Cluster robust standard errors are in parentheses.

over the whole sample period and short-run dynamics captured by the panel data. The further subdivision between low and high income shares has shown that, in the short run, incomes of the highest earners are reduced while the incomes of the lowest earners increase. By that the income gap and, thus, inequality goes down through financial liberalization

and increased access. The poorest with low collateral and connections to banks can gain access to credit and invest in their enterprises in a more developed and liberated financial system. The third hypothesis is, therefore, also confirmed.

Coming back to the long run, the results show that financial liberalization negatively affects the incomes of the poor. This supports the argumentation by Ang (2010) that too much liberalization has bad consequences in the long run. The poor might have problems handling their debts and investments and could fall back, or powerful elites still succeed in seeking rents over longer periods.

C.7 Conclusion

Standing next to major variables like globalization, demography, or technological change, finance has often been neglected in the determination of economic growth and income inequality. This seems quite unfair. From a theoretical point of view, a well-developed financial sector enhances growth by producing more information on investment projects and the acting agents on the financial markets, increased monitoring, reducing risks through diversification, and the pooling of savings. Stock markets complement the market system and these functions.

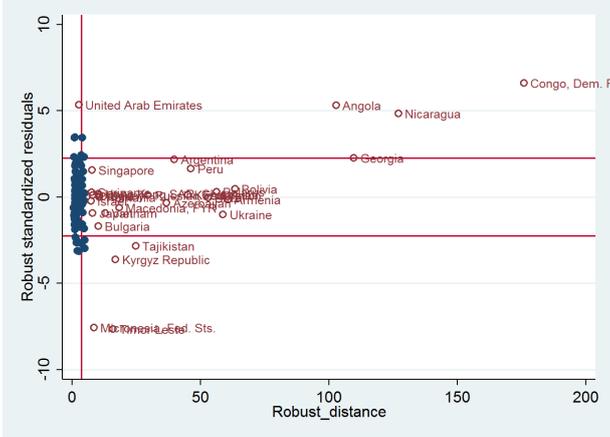
In my empirical analysis, I used a more micro-based global data set to analyze the effects of financial development and liberalization on economic growth and inequality. The positive effects of finance on growth are without doubt. Meanwhile, there was a division between cross-sectional and panel estimations using inequality as dependent variable. The long-run results captured by cross-sectional data suggests a negative effect of financial development on income inequality, while at the same time the short-run estimations done with panel techniques suggest a narrowing of the income distribution. The results with quite "exotic" variables like the numbers of ATMs in a country have shown that financial development can boost incomes of the poorest in the short run while the effect wears off over time. Causality points in the same direction as for the works by Claessens & Perotti (2007) and Hakenes & Schnabel (2010). Access to financial services and ultimately equality of opportunities are major points when trying to reduce inequality. At the same time, it is important to prevent powerful elites which exploit bad institutions and capture the rents from development for themselves. The variable of ATMs, therefore, gives a very deep indicator of financial access. While it may lack importance for major investments in business opportunities and education, it is a good indicator for whether there is financial access at all and how well the financial system spreads across a country. The sole possibility to easily access financial services and credit at various places independent of bank branches and whether you are at your home bank improves the credit allocation and reduces inequality in the short run. Therefore, it very well complements macro-variables such as private credit or micro-indicators such as accounts and bank branches.

Then again in times when the absolute banishment of cash is discussed (as proposed by Rogoff (2017)) and financial services are more and more taken to the internet and smart-pay systems, the effects of additional ATMs might disappear. Nevertheless, these findings should still hold and the importance of financial development on the microeconomic level is not negligible. There is also further scope for research in measuring financial development by the use of digital currencies or non-analogous financial services. The implications of these developments which would generate access to financial services for almost everybody on economic growth and inequality might also be very interesting and highly important for policy makers. The question will be what can be done to help less developed nations and the lower end of the income distribution to save the short run gains of financial development into the long run and how to fully benefit from the potential of financial development and liberalization.

C.8 Appendix for Chapter C

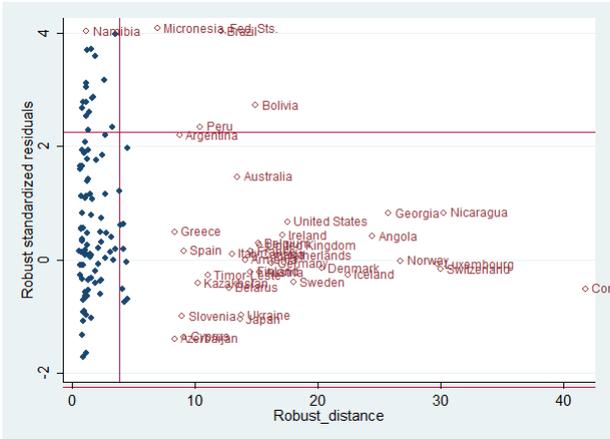
C.8.1 Additional Figures

Figure C.1: Outlier detection with standardized robust residuals and robust distances



In this figure robust standardized residuals are plotted on the vertical axis, while the horizontal axis gives the Mahalanobis robust distance. With the first, the degree of outlyingness compared to the fitted values of the regression is given, while the second measures the outlyingness compared to the other explanatory variables.

Figure C.2: Outlier detection for inequality regressions



This graph corresponds to Table C.3.

C.8.2 Additional Tables

Table C.12: Summary statistics

	Observations	Mean	Std. Dev.	Minimum	Maximum
GDP p.c.	206	9,033.64	14,381.53	167.13	106,172.80
Gini	154	40.13	8.78	24.56	62.15
Income highest 20%	153	6.29	1.90	2.16	10.67
Income lowest 20%	153	46.90	7.26	35.39	67.72
Dom. credit to private sector	192	36.59	28.15	1.31	159.48
Dom. cred. to pr. sector by banks	192	34.65	26.05	1.24	159.48
Dom. credit by fin. sector	192	48.33	36.30	-31.30	218.14
ATMs per 100,000 adults	193	38.66	43.27	0.15	249.73
Accounts per 1,000 adults	115	522.59	515.98	0.49	2,866.05
Branches per 100,000 adults	195	19.26	24.83	0.57	266.29
Credit cards	165	16.41	19.15	0	77.91
Debit cards	165	34.42	29.05	0.63	98.63
Stock market capitalization	129	41.04	50.83	0.7	360.68
Stock market turnover	124	35.58	40.37	0.30	212.69
Bank concentration	170	75.61	17.00	28.20	100
Foreign banks	139	36.58	25.02	0	95.53
Trade	203	79.06	42.56	7.20	330.58
Inflation	210	33.52	90.20	1.75	753.69
Government consumption	199	16.91	8.44	5.78	97.54
Second. school enrollment	196	62.59	31.11	6.68	139.95

Table C.13: Financial development, stock market development and economic growth: OLS regressions

	(1)	(2)	(3)	(4)
Log GDP p.c.	OLS	OLS	OLS	OLS
Dom. credit	0.018***			
to private sector	(0.0031)			
Dom. credit		0.009***		
by financial sector		(0.0026)		
Stock market			0.004**	
capitalization			(0.0019)	
Stock market				0.0003
turnover				(0.0028)
Observations	181	165	122	118
R^2	0.71	0.67	0.63	0.61

All regressions are done with OLS estimation. The dependent variable is the logarithm of real GDP per capita. Trade as the sum of exports and imports relative to GDP, the inflation rate, general government final consumption expenditure in percent of GDP, and secondary school enrollment are used as control variables. ***, **, * represent significance at the 1, 5, 10% level respectively. Heteroskedasticity robust standard errors are in parentheses.

Table C.14: Financial development, stock market development and income inequality: OLS regressions

	(1)	(2)	(3)	(4)	(5)
Gini	OLS	OLS	OLS	OLS	OLS
Dom. credit	0.070*		0.144***		
to private sector	(0.0379)		(0.0537)		
Dom. credit		0.013	-0.067*		
by financial sector		(0.0287)	(0.0380)		
Stock market				0.047**	
capitalization				(0.0186)	
Stock market					-0.023
turnover					(0.0176)
GDP p.c.	-0.0003***	-0.0002***	-0.0003***	-0.0002***	-0.0001**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.001)
Observations	143	143	143	99	95
R^2	0.27	0.24	0.28	0.38	0.34

All regressions are done with OLS estimation. The dependent variable is the Gini coefficient. GDP per capita, trade as the sum of exports and imports relative to GDP, the inflation rate, general government final consumption expenditure in percent of GDP, and secondary school enrollment are used as control variables. ***, **, * represent significance at the 1, 5, 10% level respectively. Heteroskedasticity robust standard errors are in parentheses.

Table C.15: Financial development, stock market development and income inequality: panel regressions

	(1)	(2)	(3)	(4)	(5)	(6)
Gini	FE	FE	FE	FE	FE	FE
Dom. credit to private sec.	0.011 (0.0071)		0.011 (0.0106)			
Dom. credit by fin. sec.		0.006 (0.0055)	-0.0003 (0.0082)			
Stock market capitalization				0.005 (0.0061)		0.005 (0.0059)
Stock market turnover					-0.004*** (0.0012)	-0.004*** (0.0012)
GDP p.c.	-0.0001 (0.0001)	-0.00002 (0.0001)	-0.0001 (0.0001)	-0.00003 (0.0001)	0.00001 (0.0001)	-0.00002 (0.0001)
Observations	910	912	910	700	692	692
Overall R^2	0.25	0.21	0.25	0.10	0.34	0.40

All regressions are done with fixed-effects GLS estimations. The dependent variable is the Gini coefficient. GDP per capita, trade as the sum of exports and imports relative to GDP, the inflation rate, general government final consumption expenditure in percent of GDP, and secondary school enrollment are used as control variables. ***, **, * represent significance at the 1, 5, 10% level respectively. Cluster robust standard errors are in parentheses.

Table C.16: Financial liberalization and income inequality: OLS regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gini	OLS	OLS	OLS	OLS	OLS	OLS	OLS
ATM	0.040* (0.0231)			0.149*** (0.0564)			
Accounts		-0.001 (0.0030)		-0.005* (0.0029)			
Branches			0.040 (0.0432)	0.121 (0.0833)			
Credit cards					0.157** (0.0630)		
Debit cards					0.029 (0.0.0378)		
Bank concentration						-0.032 (0.0395)	
Foreign banks							0.018 (0.0304)
GDP p.c.	-0.0003*** (0.0001)	-0.0001 (0.0001)	-0.0002*** (0.0001)	-0.0003** (0.0002)	-0.0004*** (0.0001)	-0.0002*** (0.0001)	-0.0002*** (0.0001)
Observations	143	84	145	83	129	132	117
R^2	0.25	0.11	0.25	0.22	0.28	0.26	0.29

All regressions are done with OLS estimation. The dependent variable is the Gini coefficient. GDP per capita, trade as the sum of exports and imports relative to GDP, the inflation rate, general government final consumption expenditure in percent of GDP, and secondary school enrollment are used as control variables. ***, **, * represent significance at the 1, 5, 10% level respectively. Heteroskedasticity robust standard errors are in parentheses.

Table C.17: Financial liberalization and income inequality: system GMM regressions

	(1)	(2)	(3)	(4)	(5)	(6)
Gini	GMM	GMM	GMM	GMM	GMM	GMM
Lag Gini	0.626*** (0.1840)	0.364* (0.2079)	0.502*** (0.1914)	0.378 (0.2933)	0.680*** (0.0951)	0.635*** (0.1323)
Lag ATM	0.005 (0.0176)			0.011 (0.0426)		
Lag Accounts		-0.004*** (0.0016)		-0.004* (0.0019)		
Lag Branches			0.018 (0.0163)	0.049 (0.0862)		
Lag Bank conc.					-0.044** (0.0178)	
Lag Foreign banks						-0.018 (0.0143)
Lag GDP per capita	-0.7942 (0.6608)	-0.553 (0.9849)	-1.363* (0.7642)	-0.567 (1.2948)	-0.834** (0.3367)	-1.116*** (0.5317)
Crisis dummy	-0.081 (0.5176)	-1.502 (0.1.440)	-0.177 (0.5074)	-2.007 (1.5513)	-0.078 (0.3630)	0.097 (0.3433)
Constant	19.500* (10.994)	33.728 (14.620)	29.018** (12.6773)	30.8507 (19.3025)	22.211*** (7.1634)	24.056** (9.8715)
Autocorrelation order 1	0.001	0.062	0.007	0.095	0.000	0.000
Autocorrelation order 2	0.316	0.630	0.337	0.819	0.027	0.020
Sargan test	0.000	0.016	0.003	0.016	0.172	0.296
Hansen test	0.245	0.627	0.295	0.214	0.470	0.450
Numb. of instruments	15	15	15	16	12	12
Observations	359	122	365	109	539	551

All regressions are done with system GMM estimation and the two-step estimator. The dependent variable is the logarithm of GDP per capita. The lag of GDP per capita and a crisis dummy are used as further control variables. ***, **, * represent significance at the 1, 5, 10% level respectively. Standard errors corrected for heteroskedasticity and autocorrelation are in parentheses.

Table C.18: Financial liberalization and economic growth: system GMM regressions

	(A) Income share highest 20%					
	(1) GMM	(2) GMM	(3) GMM	(4) GMM	(5) GMM	(6) GMM
Lag Income	1.316***	0.517**	0.768***	0.275	0.684***	0.690***
highest 20%	(0.3215)	(0.2193)	(0.1928)	(0.3383)	(0.1034)	(0.0848)
Lag ATM	0.015			-0.007		
	(0.0110)			(0.0367)		
Lag Accounts		-0.003**		-0.004*		
		(0.0013)		(0.0020)		
Lag Branches			-0.005	0.013		
			(0.0136)	(0.0649)		
Lag Bank conc.					-0.039***	
					(0.0151)	
Lag Foreign banks						-0.012
						(0.0108)
Autocorr. 1	0.002	0.027	0.000	0.232	0.000	0.000
Autocorr. 2	0.882	0.232	0.404	0.607	0.137	0.063
Sargan test	0.008	0.017	0.004	0.009	0.054	0.223
Hansen test	0.136	0.469	0.095	0.446	0.294	0.277
Numb. Instr.	14	15	14	17	10	11
Observations	359	122	365	109	539	551
	(B) Income share lowest 20%					
	(1) GMM	(2) GMM	(3) GMM	(4) GMM	(5) GMM	(6) GMM
Lag Income	0.387	0.283**	0.632***	0.281**	0.727***	0.685***
highest 20%	(0.3342)	(0.1147)	(0.2107)	(0.1288)	(0.0766)	(0.0876)
Lag ATM	0.007			0.008		
	(0.0065)			(0.0102)		
Lag Accounts		0.001***		0.001***		
		(0.0003)		(0.0004)		
Lag Branches			0.003	-0.028*		
			(0.0058)	(0.0160)		
Lag Bank conc.					0.008**	
					(0.0042)	
Lag Foreign banks						0.002
						(0.0027)
Autocorr. 1	0.105	0.175	0.003	0.166	0.000	0.000
Autocorr. 2	0.831	0.993	0.100	0.718	0.038	0.044
Sargan test	0.004	0.180	0.024	0.233	0.499	0.712
Hansen test	0.172	0.867	0.193	0.873	0.694	0.891
Numb. Instr.	14	14	14	15	11	11
Observations	359	122	365	109	539	551

All regressions are done with system GMM estimation. The dependent variable is the income share of the highest 20% in part (A) and the income share of the lowest 20% in part (B). A crisis dummy is used as additional control variable. ***, **, * represent significance at the 1, 5, 10% level respectively. Standard errors corrected for heteroskedasticity and autocorrelation are in parentheses.

D Contractual Saving for Housing as Early Financial Development and Its Clients in Weimar Germany

Julia Braun, Hans-Peter Burghof*, Marcel Gehrung, and Daniel Schmidt^{†‡}

Abstract

Contractual saving for housing (CSH) is one major source for housing financing in Europe. It goes back to 1920s Germany with its shortage of property financing after World War I. We use hand-picked data from the first building society to show the spread of this new financial development from Southwest Germany across the Weimar Republic. CSH was especially popular in industrial and liberal areas, whereas clients in the Prussian heartland showed little interest. Especially the upper lower and the lower middle class used CSH. We do not draw causal interpretations but argue that CSH helped people overcome financing constraints and constitutes a form of financial development by demand.

Keywords: Financial Development, Contractual Saving for Housing, Economic History

JEL Classifications: B26, G21, G51, O18, R31

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D.1 Introduction

The catastrophe of the First World War initiated major shifts in the political, social and economic order of European societies. The experiences of the Great War confronted the European population not just with the pains of war but also with major economic problems. In Germany, the costs of war as such led to a fiscal and financial disaster that culminated in a devastating hyperinflation in 1923. Examples of these costs are the reparation claims from the Treaty of Versailles worth several hundred billion US-Dollars and the detrimental effects of the occupation of several areas, in particular the core industrial zone of the Ruhr valley (Spoerer & Streb 2014). On 15th November 1923, the German Mark was exchanged into a new currency, the Rentenmark (RM), at a rate of one trillion to one. Thus, private savings were mainly wiped out. Furthermore, the deep economic and financial crisis weakened traditional financial institutions and state policies were temporarily reduced to emergency measures.

Instead, one of the problems the state could have coped with after the end of the war was the severe shortage of housing in some parts of the Weimar Republic. In contrast to the situation after the Second World War, this shortage was not due to direct war damages, but rather to low building rates. Traditional credit institutions such as savings and mortgage banks were not able to fill the gap of demand for the financing of new housing, as they were suffering from the turmoil of hyperinflation and the drastic devaluation of their deposits. The state reacted with a wide set of policy actions, subsidies, and changes in taxation (Clingan 2000). However, those measures were ultimately insufficient to trigger the needed investments. Previously introduced measures such as rent control and a high interest rate environment destroyed incentives for private building efforts even further (Gehlen 2015). In response to this lack of adequate financing supply, new financial institutions and products were developed. In particular, a special concept of a building society was introduced, the *Bausparkasse*, that offered their clients a new type of financing contract, the contractual saving for housing (CSH, *Bausparvertrag*).

Contractual saving for housing combines characteristics of a savings account and a loan within a savings collective. People with limited wealth and income join the collective to overcome their financing constraints for larger investments. They jointly pay into the collective pool during the savings phase. In this phase, the clients accept sub-market interest rates as a kind of option premium: when they reach eligibility for the loan phase, they have the right to receive a mortgage loan at a preferential rate. Thus, the concept combines the overcoming of financial constraints with locked-in interest rates and a smoothing of the financial burden over time.

We analyze archival documents of the first, and, for some time, by far most important, *Bausparkasse*, the *Gemeinschaft der Freunde Wüstenrot* (today *Wüstenrot Bausparkasse AG*), to illustrate the progress and distribution of this financial development in the 1920s

and 30s across Weimar Germany. We manually digitized over forty ledgers of CSH data on customers which were eligible for the payment of their loan. The core information for our analysis is the place of residence and the occupation of the clients. On this base, we can trace the geographical dispersion of contractual saving for housing across Germany as well as across occupations and social classes. We have to note here that this paper does not claim to draw any causal interpretations. We rather offer an extensive description of our unique and rich data set. Nevertheless, we also pose some speculative arguments for the potential reasons for these developments in the final chapters.

Contractual saving for housing started in the South-West of Germany in the states of Württemberg and Baden, as the building society from which we gathered the data is located in this region. However, and in a notable contrast with the historical precedencies in the United Kingdom, CSH almost immediately spread across state lines to many other regions of Weimar Germany. These are, besides the core market in South-West Germany, the state of Hesse, the Free State of Thuringia and other parts of Central Germany, the Prussian provinces along the Rhine, and Northern Germany, all showing a relatively high frequency of CSH customers. Remarkable is the comparatively low number of CSH customers in the Prussian heartland of Brandenburg and East-Prussia, i.e., the historical provinces of Prussia before the expansion of the Prussian state. This might be due to cultural and economic differences. While the regions with high CSH intensity are more industrialized and dominated by relatively liberal federal governments, Prussia's more paternalistic monarchy traditionally ruled with the help of an aristocracy of big landowners. Meanwhile, the remaining society was rather agricultural and comparatively poor. Also, the Prussian civil servant state might leave less room for private initiative and the adaption of financial developments.

With regard to social classes, the character of contractual saving for housing as a form of financial development becomes evident. Especially the upper lower and the lower middle class are represented in our sample of CSH customers. In these social classes, we can expect financial constraints due to missing inherited wealth and a lack of financing opportunities that can be overcome by forming a savings collective. The poorest classes did presumably not have enough income to save in any form, being too close to the subsistence level. The upper classes, on the contrary, did not necessarily need to go through CSH banks to finance large housing investments. Nevertheless, the upper classes are relatively strong in our sample of CSH customers in comparison to the general population. This shows that this financial innovation serviced a demand for housing finance across several social classes that was not satisfied by conventional credit institutions or by any other means.

The paper proceeds as follows: Chapter D.2 gives a brief overview over the basic functioning of contractual saving for housing, the regulatory environment for CSH during our period of observation and on the related literature. Chapter D.3 presents our data

collection process and the methodology for classifying CSH customers into certain social classes. Chapter D.4 presents our descriptive results. Chapter D.5 gives a brief overview over the theoretical considerations for CSH being a form of financial development, before Chapter D.6 gives some intuitions on the possible causes why CSH spread across Weimar Germany in the way it did. We then conclude in Chapter D.7.

D.2 Contractual Saving for Housing

Contractual saving for housing (*Bausparen*) is a very popular and substantial form of housing finance in continental Europe and especially Germany. Institutes of this sector account for roughly 15 to 19% of the financing volume for housing in Germany and it is often employed jointly with other instruments of housing finance. Market penetration even reaches between 30 and 60% in countries like Germany, Austria, France and the Czech Republic.¹ Similar concepts exist in the Benelux states (especially in the Netherlands) and in Eastern and Southern Europe,² while German *Bausparkassen* also service customers in China and India (Kirsch & Burghof 2018).

The basic idea of contractual saving for housing and building societies evolved in 1775 in the United Kingdom. In this year, Ketley’s Building Society was founded in the tavern ”The Golden Cross” in Birmingham. However, these early British institutions are hardly comparable to contractual saving for housing nowadays,³ as they created no permanent business model. Its members saved collectively until all members had a house, and afterwards the society was disbanded. The first building societies also mainly addressed wealthy citizens that could potentially afford a house. Thus, from 1836 onwards, benefit and permanent building societies were established in the United Kingdom (Balmer & Wilkinson 1991) that not just served future home owners but also other savers with lower income. As in many other respects during the 19th century, British innovations served as inspiration and a role-model for the development of institutions and technologies in other countries (Proettel 2017). With regard to CSH, this still holds in the early 20th century.

In Germany, CSH evolved in the 1920s, although with a slow start due to the adverse economic situation.⁴ Until the beginning of World War I, housing construction and financing was mainly determined by the market without governmental intervention. Most housing loans were granted by mortgage banks or savings banks. These financing sources were mostly wiped out by the hyperinflation of the 1920s. Due to a combined desire for

¹Data is available from the Verband der Privaten Bausparkassen, OeNB, EFBS, and Eurostat.

²Namely Belgium, Croatia, Hungary, Italy, Luxembourg, Poland, Romania, and Slovakia.

³In the following, we will use the terms banks for contractual saving for housing and ”building societies” interchangeably. However, building societies are technically different from CSH banks in terms of their organizational structure and ultimate savings goal. Furthermore, Anglo-Saxon building societies also offered loans for other purposes than home building, CSH banks are bound to the purpose of housing financing (Gehlen 2015).

⁴The CSH bank of our analysis was also already established in 1921 but also suffered from the oncoming hyperinflation before it was successfully launched after (Langer 1965).

residential property by a growing part of the general public and a severe housing shortage after the war (Berndt et al. 1994), the first specialized banks for contractual saving for housing emerged in 1924 and 1925.⁵ While there were some building activities, this supply did not match the actual demand. Especially the lower social classes were searching for small and affordable apartments and housing which were not provided in a sufficient amount (Clingan 2000). At the same time, upper class residential property was available in abundance and did not find enough buyers (Gehlen 2015). Meanwhile, hyperinflation led to a breakdown of capital market financing for housing, while mortgage bonds disappeared completely (Holtfrerich 1986). Similarly, savings banks could not grant credit from their deposits, since these savings also dramatically lost in value. Thus, it was not the actual destruction through war that led to a severe housing shortage especially for the lower classes, but the lack of conventional financing, and actual building operations offered only a limited dwelling stock. Contractual saving for housing was created as a concept of housing finance to meet this demand for financing independently from conventional capital markets (Müller 1999).

With the hand-picked data we present in this paper, we demonstrate the development of this special form of financial development from its early roots on the German financial markets. Since then, contractual saving for housing is a special product offered only by the aforementioned specialized banks, the *Bausparkassen*. These institutions are restricted in their funding and investment opportunities by national law (the modern *Bausparkassengesetz* and *Bausparkassenverordnung*). The legal foundation for cooperative savings collectives such as CSH banks and building societies were already established in 1868. During the 1920s, the German government further established a housing subsidy and a tax on inhabited housing to push public loans and to support real estate financing. Specialized credit institutions such as CSH banks were established to buffer the falling loan provision by traditional credit institutions.⁶ In 1931, i.e., after the establishment of the first *Bausparkassen*, a specialized regulatory footing for contractual saving for housing and the associated building societies was created. The main purpose was to protect customers from potential misuse of their deposits (Müller 1999).

The specific financial contract of *Bausparkassen*, the *Bausparvertrag*, is split into two phases. The first period is the savings phase in which customers regularly pay into their accounts. However, during this savings period, the offered interest rates by the banks are below the market interest rate. As soon as a critical threshold is reached, the customers become eligible to takeout a loan from the bank which complements the contract.⁷ Again,

⁵Those were namely the *Gemeinschaft der Freunde Wüstenrot* and the *Deutsche Bau- und Siedlungsgemeinschaft*.

⁶The applicable legal foundation was the *Gesetz über Depot- und Depositengeschäft* (Müller 1999).

⁷Note that eligibility does not only depend on the individual savings efforts. The threshold level is fixed, but depends on the collective savings volume of the respective group of customers. Today, this collective component is combined with a rather large buffer to reduce the customers' risk of late eligibility.

the interest rates are below the market value at the time of the contract signing and now put the customer in an advantageous position. Additionally, both, the saving and borrowing interest rate, are locked in, which protects the customers from unprofitable movements of the interest rate. Without a contract, borrowers would lose when market interests go up and their housing credit becomes more expensive. Although they earn less from saving in the first phase than they could by just putting the money into a regular savings account, they profit from a lower borrowing rate in the second phase which is also protected against increasing interest costs. Meanwhile, the loans are granted from the whole pool of savings built by the customers of a bank collectively and will only be granted if enough funds have been accumulated.⁸

Again, this collective savings behavior stems from the experiences of a society with no or only hardly developed or damaged capital markets and credit agencies. Borrowers have to save a substantial amount to finance the building of a house. By forming a collective, several borrowers with the same saving goal can come together and reach the required amounts of capital while decreasing the waiting time until construction can begin (Burghof et al. 2017). In principle, this is done without any involvement of capital markets.

Kirsch & Burghof (2018) show in a contract-theoretical setting that the concept of contractual saving for housing exhibits learning effects. They use the concept of repeated financial contracts to show that the savings phase can efficiently be used as a screening device to identify customers with a higher long-term capacity to save. In this sense, it complements the classical assessment of credit worthiness that is focused mainly on the actual financial situation of the prospective debtor. They show in particular that contractual saving for housing is the second-best efficient financial contract if the required amount of financing is large relative to the household's income, as is often the case if wage earners with modest means strive to realize their private housing project.

The sparse empirical research on contractual saving for housing mainly focuses on the analysis of returns and the inherent interest rate guarantee. Zietemann (1987) and Scholten (1999) look at different scenarios for changes in interest rates and do not find an intrinsic value of taking out a CSH contract, while Cieleback (2002) and Rietmann (2005), using the methods of classical option pricing, replicate the locked in interest rate with alternative capital market instruments. They find that this interest hedge could be reached with lower costs, when taking the fees of CSH banks into account. However, these approaches ignore that most clients have no access to such products, and it also does not price several services and further contractual options that are typically embedded in CSH contracts. Looking at the concept from a different angle, Börsch-Supan & Stahl (1991) found that customers of contractual saving for housing increase their overall savings rate.

⁸Banks for contractual saving for housing also act "outside" of their collective business by granting regular loans to customers. This other side of their business became more important over the recent years with a decreasing proportion of the collective business (Burghof & Gehring 2019).

Burghof et al. (2017) investigate the default risk of contractual saving for housing customers. As predicted in Kirsch & Burghof (2018), they find that CSH represents a special relationship-based form of financing that is marked by lower default risks. At first sight, such relationship-based lending concepts fit well to the German financial system. Furthermore, it shows that the special potential for relationship banking in Germany is not limited to the many regional financial institutions that are, spatially, close to their customers. We can find CSH institutes in all three pillars of the German banking system (private banks, public savings banks and co-operative banks),⁹ and they address clients within larger portions of the country or even on a national level. In this paper, we can show that even the first German CSH institute, in contrast to UK building societies, followed a national approach from the very beginning.

Lastly, Molterer et al. (2017) show in a recent study that contractual saving for housing is stabilizing the economy as a whole, as its clients are hedged against adverse developments of the interest rate and thus can act anti-cyclical, i.e, finance their housing project even in times when loans are rather costly. However, we expect that this anti-cyclical behavior only occurs when interest rates fluctuate in a non-predictable way. In recent times, the persistently low interest rates might endanger this positive effect. Nonetheless, Molterer (2019) finds that specialized financial intermediaries, such as building societies, are very stable despite generally less diversified revenue streams, and, thus, are more resilient to economic shocks.

D.3 Data and Methodology

We gathered data from roughly 40 volumes of collected documents of one of the largest German CSH banks on assignments (*Zuteilungen*) of loans to their customers in the period from 1924 to 1933. All volumes are typewritten and bound in ledgers similar to the ones pictured in Figures D.9 and D.10 in the Appendix. Data was also available for later years until 1942 but we decided to limit our analysis to the period named above, as the takeover of government by the new dictatorial regime of the Nazis brought a new framework for economic activities that would bias our results.¹⁰ In particular, saving activities were channeled towards government treasuries and bonds to finance the armament and preparations for ensuing war.

By manually copying the entries, we obtain data on the customer reference number (*Bausparnummer*), the full names of the customers, their occupation, their place of residence, the respective state of the Weimar Republic, the contractual amount (*Baus-*

⁹For more on the three pillars of the German banking system and its decentralized character see Ferri et al. (2014) or Chiaramonte et al. (2015).

¹⁰Even the design and wording of the financial statements of the building society of our sample changed markedly between 1931 and 1933. The CEO of the building society was replaced and the statements in the preamble of the report are specifically written to match NS-ideology and had to contain certain keywords.

parsumme), possible increases or decreases in this amount, a percentage of how much was already saved, and the time the contract was already running. Due to data protection, we delete the names of the customers. Furthermore, the customer reference numbers are not always consistent (some appeared twice or were coded differently). Therefore, we generate our own running ID for all clients in our data set. In a next step, we unify the different spellings of occupations and places of residence. The contractual amount refers to the maximum amount the building society will pay its customer after her contract becomes eligible for payment, i.e., it consists of the already saved amount plus the loan amount.¹¹

We track all CSH customers in our files across a map of the German Empire to show the geographical dispersion of contractual saving for housing in the respective time period. To this purpose, we obtain GPS data (longitude and latitude) from GPS visualizer¹² and match them to shapefiles for the 1925 statistical units of the German Empire obtained from mosaic.¹³ Since our data does not offer exact addresses with street names, we collect the coordinates of the cities, municipalities and villages. If names of locations have changed since the 1920s and 30s (e.g., since former cities in Eastern Prussia are now Polish) or have been integrated to larger municipalities nowadays, we manually researched their original names and borders to ensure the right attributes of the respective CSH customers.

To draw comparisons on the participation of the different social classes we use the standard procedure from the literature according to Schüren (1989), who describes the social developments mainly based on the occupation of economic agents. Alternatively, we could have used the HISCO classification according to van Leeuwen & Maas (2011). Nevertheless, we stuck with Schüren since the job descriptions and names are specifically drawn from the German language and, thus, fit much better. Occupation captures both, social status and the earnings capacity of a worker (van Leeuwen & Maas 2011). Thus, based on the occupation of the clients, we can analyze the alleged initial wealth of a CSH customer and whether she belongs to the, presumably richer, upper class or rather to the poorer lower classes within the economy. We might expect that people without much inherited wealth and lower expected life earnings will be more prone to enter contractual saving for housing to overcome financial constraints. Within the classification scheme by Schüren (1989), we can distinguish between different social classes or milieus. This enables us to investigate which parts of the population used contractual saving for housing more frequently and the possible reasons for that.

Schüren (1989) takes three steps to classify occupations and to build a systematic

¹¹Customers are not obliged to take a loan when it becomes eligible. Alternatively, they could wait for a suitable date to realize their housing project. In fact, most modern CSH contracts explicitly bind the financing to a housing project. However, the clients can use the saved amount for any purpose. Giving the recent low interest rates, the saved amount is often used as equity in a housing project that is financed without the CSH bank.

¹²You can view the website under <https://www.gpsvisualizer.com/>.

¹³For further information visit <https://censusmosaic.demog.berkeley.edu/data/historical-gis-files>.

distinction across different dimensions of jobs. The first dimension accounts for the social class a job places the individual in. This could be (1) the lowest lower class, (2) the middle lower class, (3) the upper lower class, (4) the lower middle class, (5) the upper middle class, and (6) the upper class. The second dimension captures the position a worker has in her respective profession, i.e., whether she is an employee or rather a manager or civil servant.¹⁴ This dimension contains the classifications (1) employee (apprentice, journeyman, or day laborer), (2) employee under house law (servants), (3) self-employed (craftsman or freelancer), (4) journeymen or foremen, (5) self-employed foreman or factory foremen, (6) salaried employees, (7) civil servants or commissioned officers, or (0) others. The third dimension captures the sector of an occupation or the milieu. This can either be (1) farming, (2) domestic service, (3) craftsmanship, (4) home trade, (5) industry, (6) craftsmanship or home trade or industry, (7) trade, banking, insurance, or transportation, (8) professions, (9) civil service, church service or federations, or (0) others. This scheme results in a three-digit number for up to 65 different groups of occupations, or roughly 6500 individual job descriptions.¹⁵

Of course, the occupation does not tell the whole story about the social standing of a person. A shopkeeper might be very successful and, therefore, much richer and less financially constrained than a mid-level civil servant. Also, the social status of farmers might differ from our classification, and can depend on regional factors like the fertility of the soil and differing inheritance laws in the German states. Nonetheless, following Schüren (1989), we use the occupation in our analysis as the best available proxy for the social status and degree of financial constraints.

Within our data, the social status of the many pensioners and widows seems questionable. Formally, these persons are listed with the code 700, i.e., they have no identifiable occupation. To gain a better view on the social status of these groups, we use, whenever available, their former occupation or respectively the occupation of their late husband. The overall number of observations is relatively constant over the years, with a total of 11,207. The number of observations for each year as well as some summary statistics of the contractual amount can be found in Table D.7¹⁶ in the Appendix.

Our hand-picked data comes with some drawbacks. We analyze data from the first CSH bank that was also market leader during the observation period. In this sense (and with the respective bias), our data is representative for the advance of CSH as financial

¹⁴Civil servants are ranked relatively high. This might be the case, since the classification is similar to the distinction of the working population by the Prussian statistical office. State clerks were very well recognized and respected in Prussian society.

¹⁵E.g., an accountant is coded as 567. He belongs to the upper middle class, is a salaried employee and works in the trade, banking, insurance, or transportation industry. A factory worker enters as 215, thus, an employee from the middle lower class and foreman. Lastly, a state clerk is registered under 669, thus, from the upper class, a salaried employee and in the civil service.

¹⁶There is a small decrease in the number of observations and the average contractual amount after the financial crisis of 1929.

development in Weimar Germany, although we cannot include the unavailable data from the few competitors.¹⁷ Furthermore, the reported range of occupations for women is often rather narrow. Historical sources do usually not enumerate work taken up by women. This might lead to an inherent bias in our analysis, as can be found in other studies (van Leeuwen & Maas 2011). We circumvent this problem to some extent, since we have some data on the social classes and occupations of women. Whenever we find remarks on their social standing or on the occupation of their husband in our files,¹⁸ we include this data. Given the comparatively high number of widows among the early CSH customers, we thereby can take into account a much broader female population in our analysis than other studies.

D.4 Descriptive Results

Figures D.1, D.2, and D.3 show the geographical dispersion of contractual saving for housing customers who reach eligibility for payments across the Weimar Republic (i.e., after the preceding savings period) for the years 1924 to 1929. In 1924, only one contract was eligible for the credit phase. This first contract in Heidenheim in the state of Württemberg foreshadows a pattern which is visible throughout the years. CSH is based in southern Germany, especially in Württemberg and Baden.

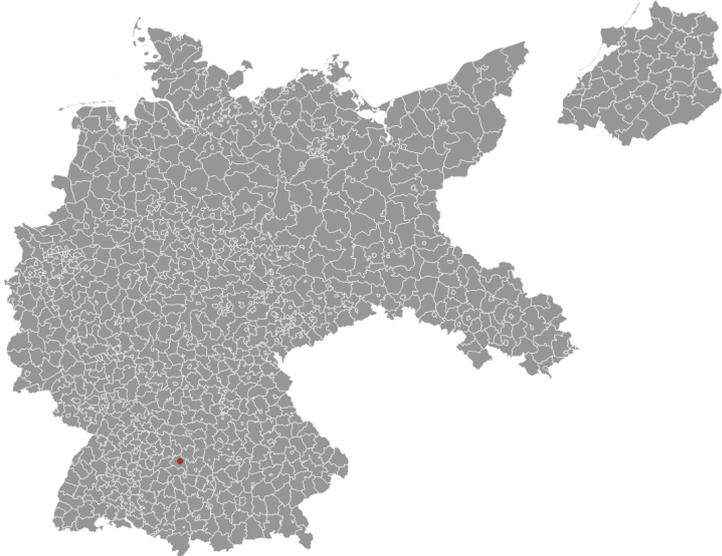
The clustering of early CSH customers in the South-West can also be seen in Figure D.4 that illustrates the frequency of different cities in the observations for the years 1924-1929. It becomes visible that the region of Stuttgart and adjunct municipalities are the core business areas for contractual saving for housing. However, these results already show that the dispersion of CSH soon crossed state borders and a fast geographical dispersion across the whole of Weimar Germany. In addition to Württemberg and Baden, there are also high numbers of CSH customers in Hesse and the Free States of Bavaria and Thuringia. The Prussian territories along the Rhine and in Northern Germany also have a high CSH presence. In stark contrast to this observation, the historical regions of Prussia before 1868 around Berlin and in Brandenburg show only little or no CSH observations. We will go into more detail about this observation later on.

We can also observe some CSH clients that live far from the original base of the CSH business in the German Southwest. Contracts appear in Silesia and East-Prussia far in the East, and there are also numerous contracts in Austria and the French border regions of Alsace and Lorraine. With regard to the historical documents, Austria had a special focus.

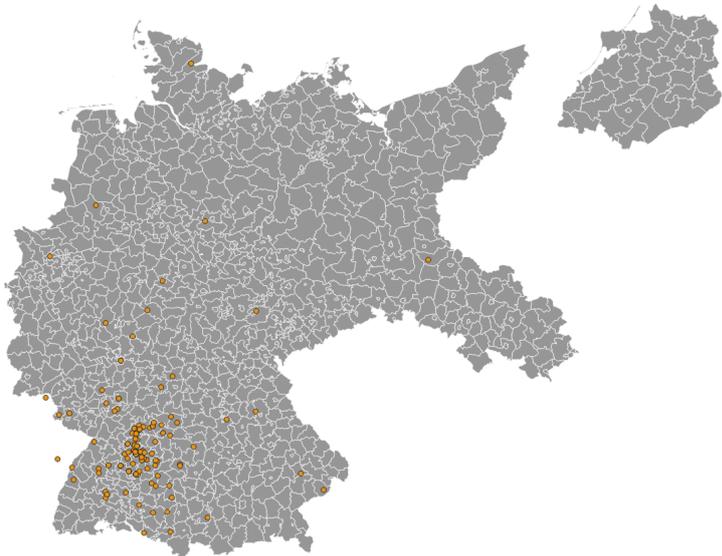
¹⁷Our CSH bank was not the sole competitor but one of the earliest to offer this form of housing finance. The nowadays biggest competitor *Bausparkasse Schwäbisch Hall* was only founded in 1931. Other earlier competitors were the aforementioned *Deutsche Baus- und Siedlungsgemeinschaft* from Darmstadt founded in 1925, the *Creditgenossenschaft des Christlichen Notbundes zur gegenseitigen Hilfe* or *Leonerger Bausparkasse*, and the *Hamburger Bausparkasse* both founded in 1929.

¹⁸We are aware of the fact that this might lead to a positive bias with regard to the situation of widows, as many might have lost their social and economic status after their husband died.

There were several ledgers specifically dedicated to CSH-business in Austrian regions. The two most distant examples can be found in the former German colonies, although these were already surrendered to other colonial powers after the First World War: a contract with the Bambuli-Mission in East-Africa reached its maturity in 1928, and a doctor from Omakuru in Namibia in 1929. Finally, we find a contract in the Mexican state of Sinaloa in 1930.



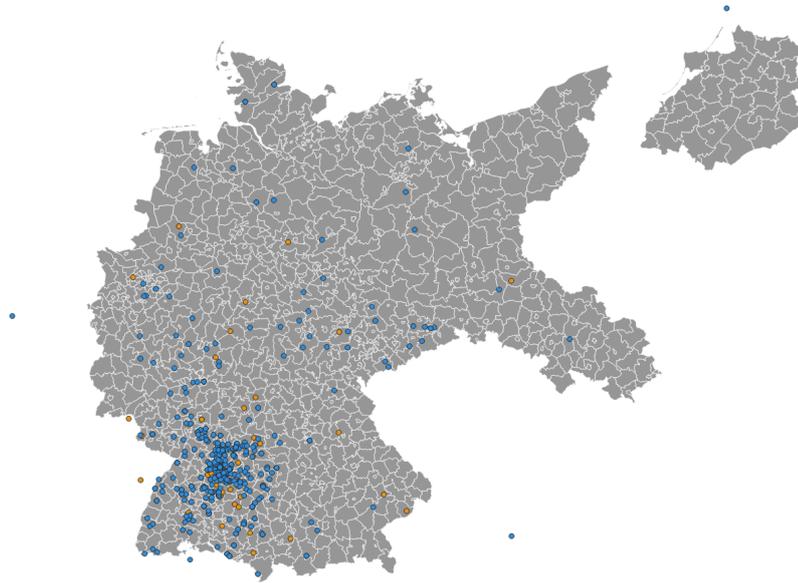
1924



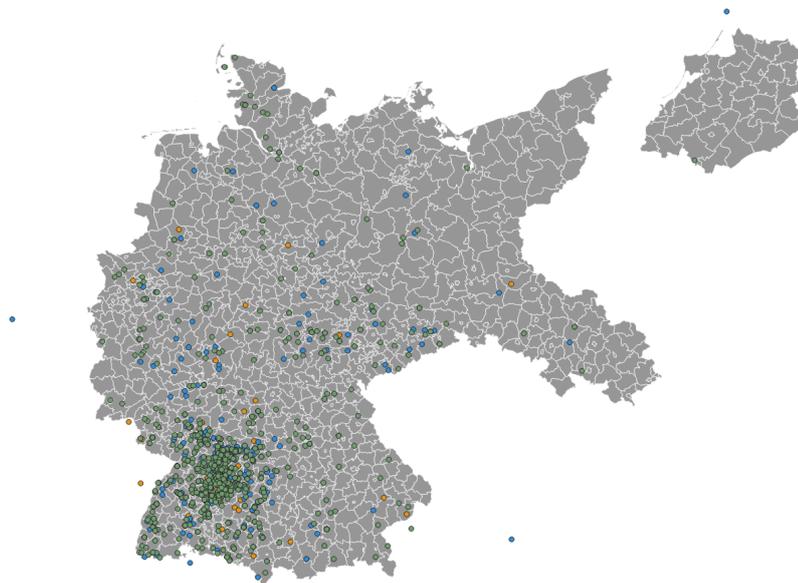
1925

Figure D.1: Geographical Dispersion of Contractual Saving for Housing Customers, 1924-1925

Figures D.5 and D.6 show the geographical dispersion of CSH in the Weimar Republic for the 1930s. One might expect different results for the diffusion of financial development

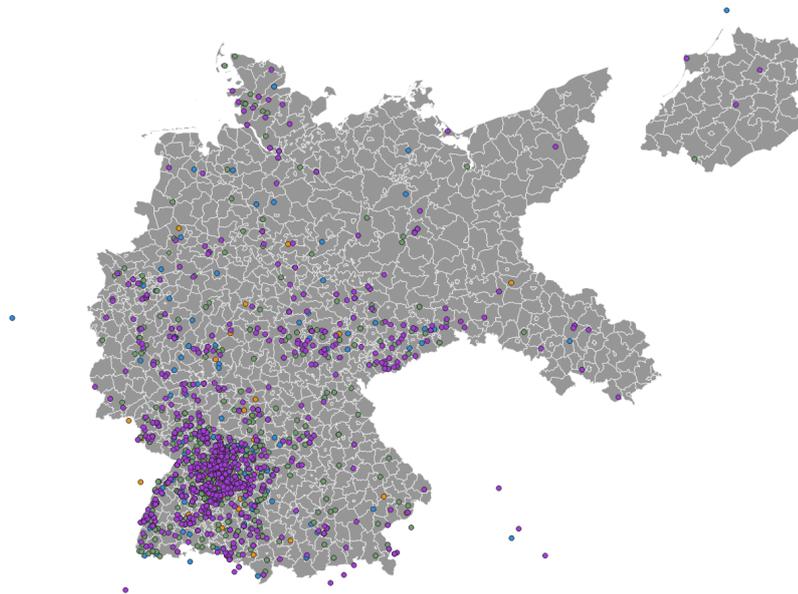


1926

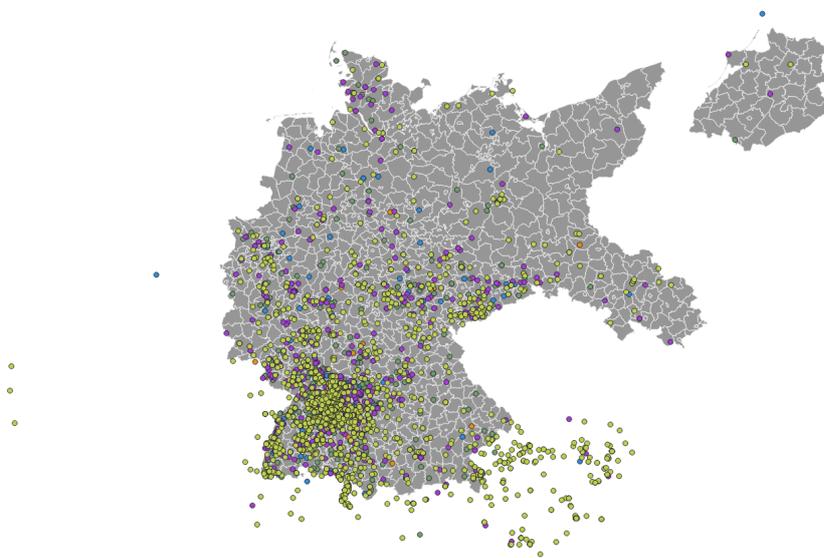


1927

Figure D.2: Geographical Dispersion of Contractual Saving for Housing Customers, 1926-1927



1928



1929

Figure D.3: Geographical Dispersion of Contractual Saving for Housing Customers, 1928-1929

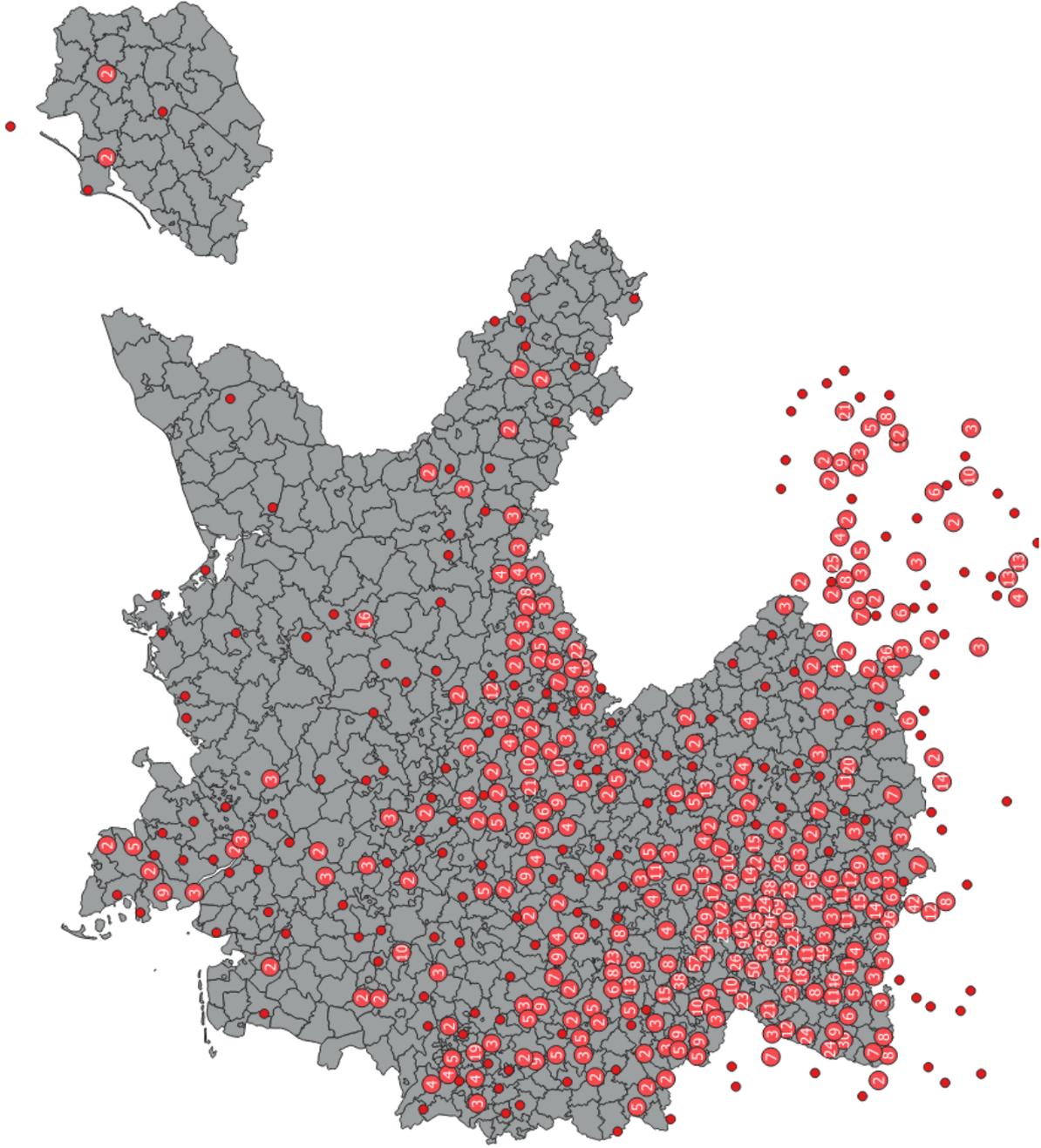


Figure D.4: Geographical Frequency of Observations of Contractual Saving for Housing Customers, 1924-1929

Higher numbers indicate a greater frequency of CSH observations for this city.

after the financial crisis of 1929 (Müller 1999), but this is not the case. The geographical spread is similar to the 1920s, with Baden and Württemberg being the core markets for CSH, with substantial numbers of customers in Central and Northern Germany, and the regions of the Rhineland and Thuringia. Figure D.7 shows the frequency of observations for the years 1930-1933 and gives a similar picture. Although it shows slightly more CSH customers, the Prussian heartland around Berlin and the state of Brandenburg has still comparatively little CSH presence. Furthermore, we find a higher number of CSH customers in bigger cities and metropolis.

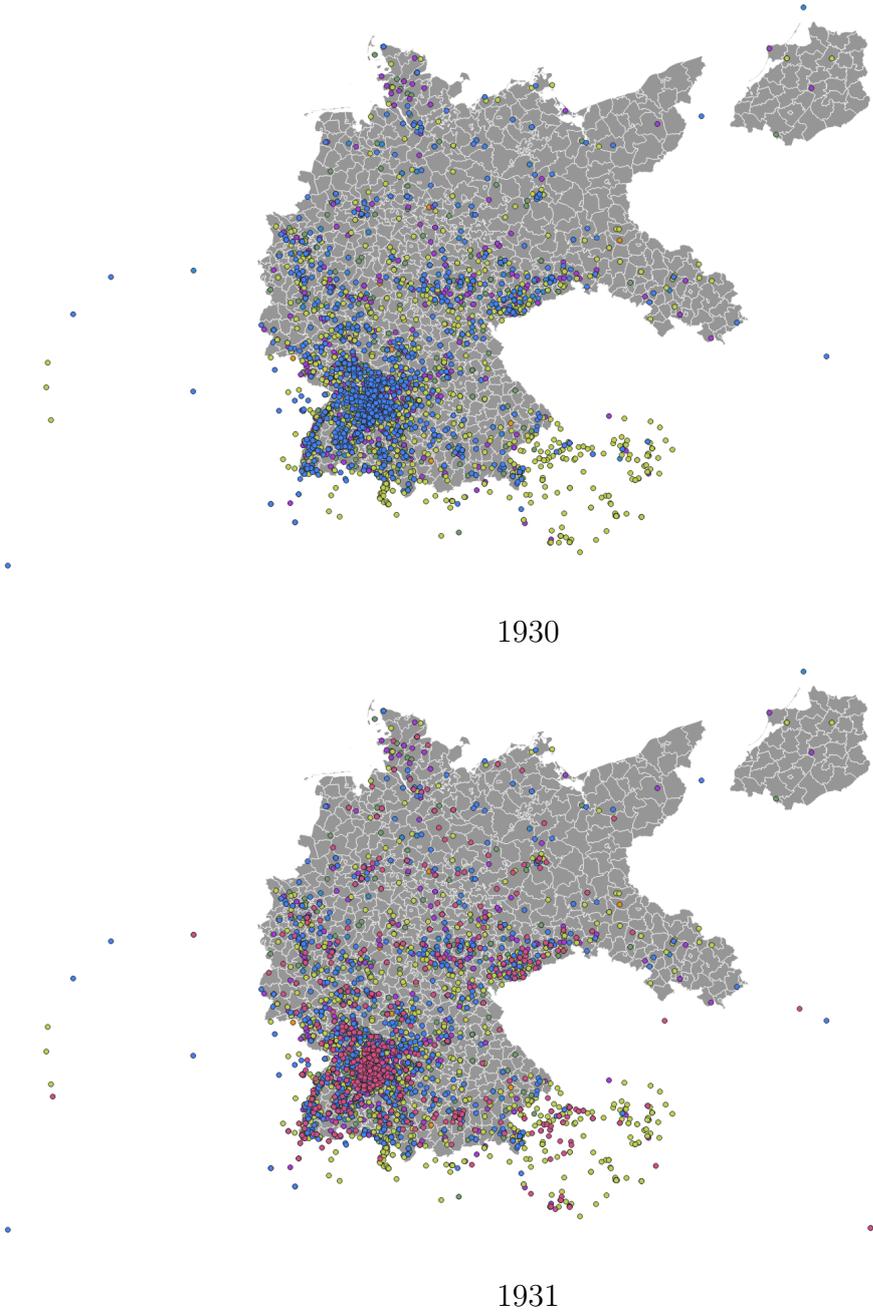
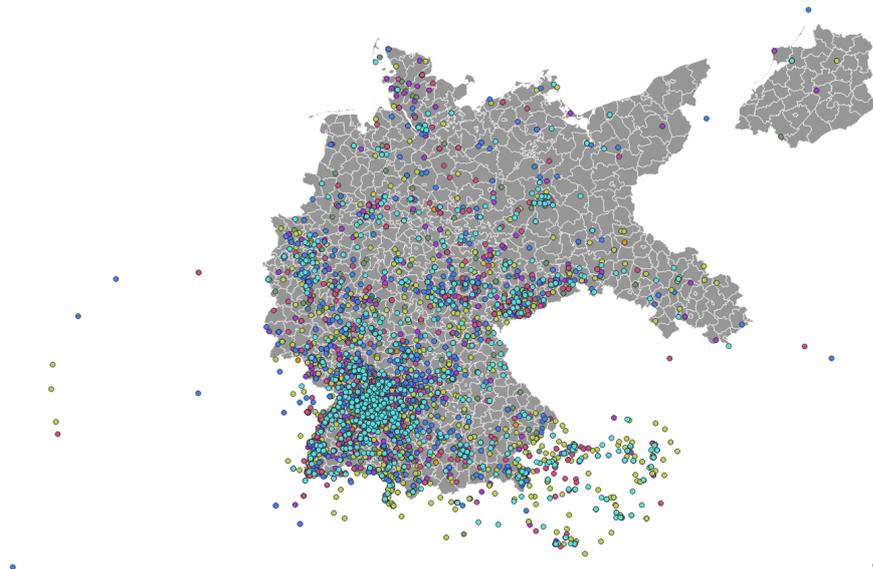
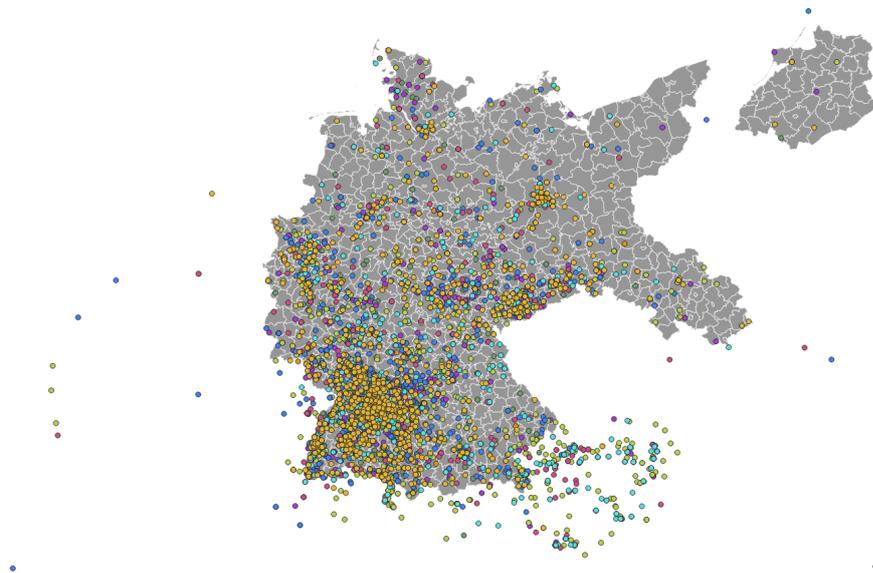


Figure D.5: Geographical Dispersion of Contractual Saving for Housing Customers, 1930-1931



1932



1933

Figure D.6: Geographical Dispersion of Contractual Saving for Housing Customers, 1932-1933

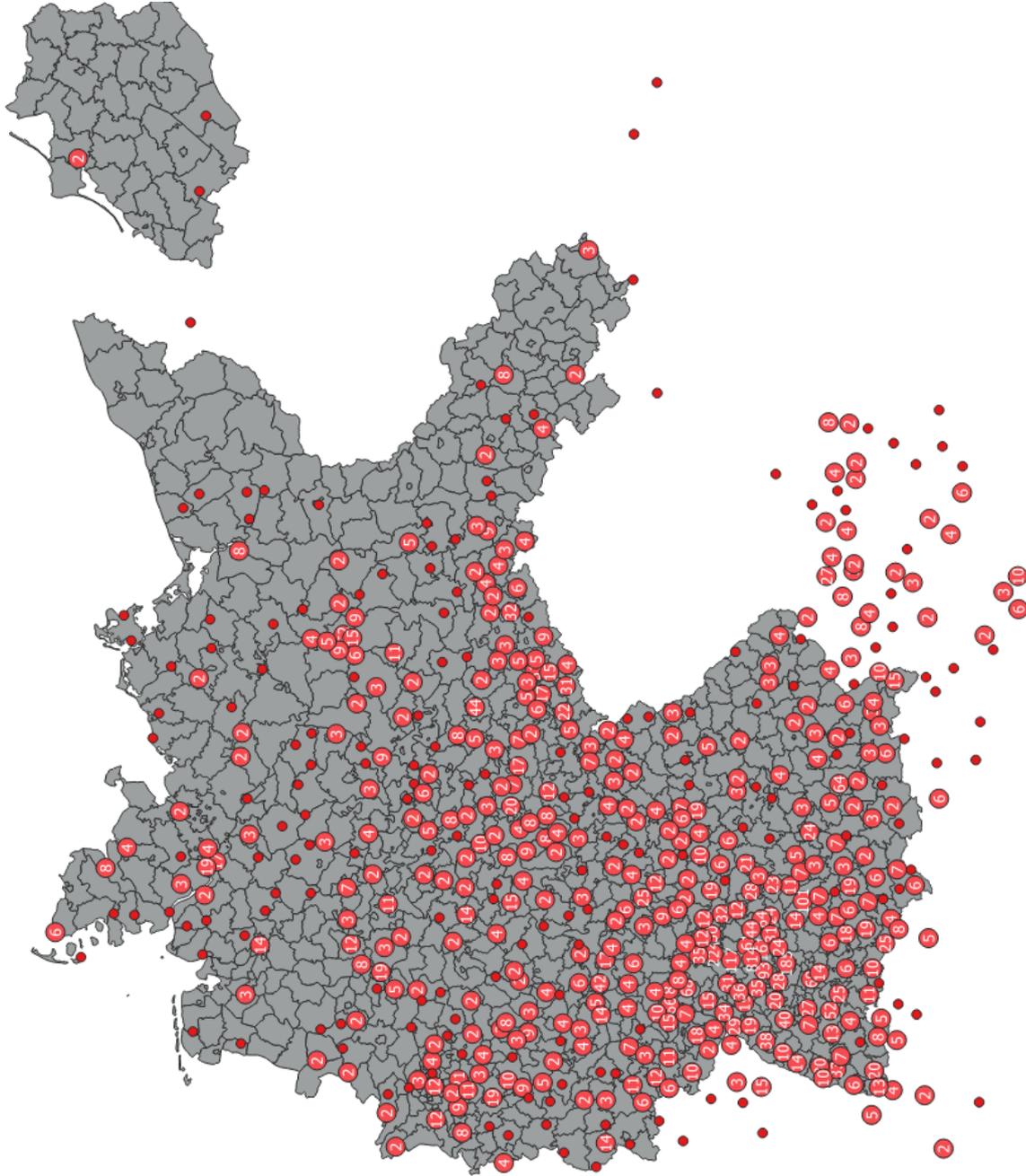


Figure D.7: Geographical Frequency of Observations of Contractual Saving for Housing Customers, 1930-1933

Higher numbers indicate a greater frequency of CSH observations for this city.

With respect to these findings, we also observe a peer-to-peer dissemination of contractual saving for housing as a form of financial development within certain regions. Anecdotal evidence from our historical documents supports this idea. E.g., in 1927, three masons from the small town of Denkendorf reached eligibility for payment for their contractual saving for housing for the same amount shortly after each other. It is very likely that these three masons must have had a communication on the topic before signing the contracts. They are a good example for people with restricted incomes and financing constraints that decide collectively to save their money within building societies to overcome financing barriers to finance their housing project. Other examples are six business men from the city of Stuttgart who all signed contracts for RM 40,000 in 1928 or two physicians from Leipzig with similar contracts in 1933.

In the following, we look at social classes, economic sectors and occupations, as defined by Schüren (1989), to further investigate which groups within the population are the most frequent CSH customers. Table D.1 shows the frequency of observations for the different social classes (1 being the lowest and 6 the upper class) for the years 1924 to 1933. The years 1924 to 1926 have been aggregated to achieve a similar number of observations in comparison to the other years. If the occupation of a customer was not registered, they are entered as miscellaneous with the code 700. The same holds for associations, congregations or similar communities which jointly signed a contract, retirees without a record of their former occupation, and women without a clear job description. Furthermore, the table reports the average, minimum, and maximum contractual amount for the different groups.

Our evidence shows that especially the upper lower class and middle class are most prominent in our sample of CSH customers. Their frequency lies in the range between 20 and 30%, with the lower middle class becoming more relevant in the later years. The lowest and middle lower class have the lowest frequency.

On the other hand, CSH is also fairly present in the upper classes that usually do not have to worry about the subsistence level and might face only little financing constraints. Typically, the clients from these strata sign for larger amounts to finance more ambitious housing projects. Thus, CSH reached the whole population apart from the very poor. Seemingly, given the shortcomings other sources of housing finance, the concept had its special appeal for very different groups within the society.

Table D.2 presents the position of CSH customers within their occupation (1 being an employee and 7 a civil servant). Most observations are recorded for the self-employed, salaried employees and civil servants. The last group makes up over a quarter of all CSH customers in 1924-1926. This proportions decreased to roughly 16% in 1933. However, this development and especially the 1930s show that CSH has become a topic independent of the job positions of the prospective clients. We also report the contractual amounts, but they show no irregularity with regard to different job positions. The category “others” reaches a slightly higher contractual amount, as the category also contains associations

Table D.1: Social Classes and their Contractual Amounts of CSH Customers, 1924-1929

	Social Class	Obs.	Freq.	Mean	St. dev.	Min	Max
1924-1926	1 (lowest lower class)	16	2.77%	9,125	3,721.56	4,000	16,000
	2 (middle lower class)	17	2.95%	10,647.06	5,733.03	5,000	25,000
	3 (upper lower class)	117	20.45%	13,559.83	7,518.70	2,500	40,000
	4 (lower middle class)	176	30.68%	15,312.50	7,475.99	3,000	50,000
	5 (upper middle class)	109	19.06%	17,876.15	9,036.23	2,500	70,000
	6 (upper class)	110	19.24%	19,940.91	11,048.63	6,000	70,000
1927	1 (lowest lower class)	55	4.56%	7,418.18	3,550.90	2,000	21,000
	2 (middle lower class)	41	3.40%	10,539.02	4,284.56	1,100	20,000
	3 (upper lower class)	301	25.04%	11,913.95	7,893.33	2,000	90,000
	4 (lower middle class)	374	31.09%	17,847.59	19,840.57	1,000	350,000
	5 (upper middle class)	194	16.09%	17,689.73	10,109.73	2,000	65,000
	6 (upper class)	189	15.67%	22,595.24	10,533.45	5,000	65,000
1928	1 (lowest lower class)	62	4.14%	9,483.87	5,087.50	2,000	30,000
	2 (middle lower class)	73	6.05%	9,089.04	3,149.45	2,500	16,000
	3 (upper lower class)	342	28.33%	12,554.09	7,235.31	2,000	60,000
	4 (lower middle class)	328	27.26%	16,381.10	8,820.30	3,000	50,000
	5 (upper middle class)	196	16.32%	17,567.86	11,314.52	1,900	100,000
	6 (upper class)	158	13.17%	26,221.52	32,210.42	5,000	400,000
1929	1 (lowest lower class)	84	4.01%	9,785.71	5,330.23	3,000	30,000
	2 (middle lower class)	122	5.82%	10,073.77	4,877.28	3,000	35,000
	3 (upper lower class)	560	26.73%	12,976.74	7,597.48	2,000	60,000
	4 (lower middle class)	634	30.26%	17,138.23	9,989.33	1,000	75,000
	5 (upper middle class)	355	16.95%	17,181.41	9,659.22	2,000	60,000
	6 (upper class)	273	13.03%	20,704.76	11,444.59	2,400	600,000

We classified all customers and their respective occupations to the corresponding social class of a job according to the scheme by Schüren (1989). The social class can either be (1) the lowest lower class, (2) the middle lower class, (3) the upper lower class, (4) the lower middle class, (5) the upper middle class, and (6) the upper class. We report the number of observations for each class and their frequency relative to the total number of observations. Since not all customers could be assigned to a social class, the frequency does not add up to 100%. Furthermore, we report the mean, standard deviation, minimum and maximum value of the contractual saving for housing contractual amounts of customers in *Reichsmark*.

or whole communities, i.e., clients that tend to sign for larger amounts.

Table D.3 presents the frequencies and contractual amounts for the different economic sectors. The major sectors with a CSH presence are industry, craftsmanship and the civil service. This relates to the self-employed, salaried workers, and civil servants that are particularly often invested in CSH contracts. In the first years, civil servants appear as CSH clients with the highest frequency, but the relative importance of these clients decreases with the years, and other sectors are catching up. We observe the highest contractual amounts for the sector of professions, i.e., doctors, pharmacists, or architects, and the like, which tend to have an income well above the average.

Tables D.4, D.5, and D.6 report the results for social classes, job positions, and economic sectors for the period of 1930 to 1933. Similar to the findings for the geographical dispersion, the results do not differ qualitatively in comparison to the 1920s. The lower middle class gains a larger dominance compared to all other social classes, while the predominance of the civil service among CSH customers decreases.

Figures D.11, D.12, and D.13 in the Appendix further visualize the development of the frequencies of CSH customers in different parts of society across time. From 1924 to 1928 (blue bars) the upper lower class gains more prominence, while the lower middle class loses some ground. In the 1930s (red bars), the frequency of the lower middle class increases. However, during the whole observation period these two social classes form the main cluster for CSH customers. Meanwhile, the relative importance of the upper class decreases across the whole observation period.

With regard to the job positions, the significance of salaried employees and civil servants decreases over time, while employees, the self-employed and foremen more frequently enter into CSH contracts. With regard to economic sectors, the civil service still holds the lion share of CSH observations. However, these numbers markedly decrease, while the frequencies of observations for craftsmanship, industry, and the professions grow.

One might remark here, that the distribution of CSH customers especially across the different social classes could simply reflect the distribution of the whole German population. This might be true to some extent, but the population data for a selection of German cities at the beginning of the 20th century from the book by Schüren (1989) in Figure D.14 in the Appendix shows that the population distribution does not follow a standard bell curve.

The data is given for more northern cities in Westfalia and for some cities in the South and in Central Germany for the years 1907, 1925, and 1936. In major cities (e.g., Berlin in Panel (B)) as well as in more rural towns (such as Nürtingen in South-West Germany in Panel (A)), the upper lower class has the largest weight in the overall population. However, the lower middle class and the upper tail of the distribution are much less pronounced than in the distributions for our CSH customers. At the one hand, this stresses the fact that CSH was mostly used by the relatively lower incomes in the middle class, which

Table D.2: Job Positions and Contractual Amounts of CSH Customers, 1924-1928

	Position	Obs.	Freq.	Mean	St. dev.	Min	Max
1924-1926	1 (employee)	61	10.75%	12,081.97	6,819.81	4,000	40,000
	2 (empl. house law)	-	-	-	-	-	-
	3 (self-employed)	90	15.60%	20,455.56	12,716.80	3,000	70,000
	4 (foreman)	62	10.75 %	14,137.10	8,113.02	2,500	40,000
	5 (self-empl. foreman)	4	0.69%	14,250.00	5,560.28	9,000	20,000
	6 (salaried employee)	140	24.44%	14,660.71	6,897.57	2,500	40,000
	7 (civil servants)	151	26.52%	16,625.83	8,055.89	5,000	60,000
	0 (others)	65	11.27%	17,815.38	7,954.74	3,000	40,000
1927	1 (employee)	152	12.60%	9,855.92	5,781.08	1,100	40,000
	2 (empl. house law)	-	-	-	-	-	-
	3 (self-employed)	216	17.91%	19,817.13	12,604.08	2,000	90,000
	4 (foreman)	179	14.93%	12,022.91	8,694.25	2,000	90,000
	5 (self-empl. foreman)	6	0.50%	14,583.33	13,705.53	2,500	40,000
	6 (salaried employee)	242	20.07%	15,344.25	7,555.05	1,000	40,000
	7 (civil servants)	262	21.81%	18,263.36	9,096.51	2,000	65,000
	0 (others)	147	12.19%	21,078.23	29,292.73	3,000	350,000
1928	1 (employee)	202	16.74%	10,012.38	5,063.32	2,000	40,000
	2 (empl. house law)	3	0.25%	16,666.67	11,547.01	10,000	30,000
	3 (self-employed)	234	19.39%	19,082.48	13,078.58	1,900	80,000
	4 (foreman)	204	16.90%	12,556.37	6,901.53	2,000	40,000
	5 (self-empl. foreman)	13	1.08%	14,615.38	5,042.13	7,000	250,000
	6 (salaried employee)	202	16.82%	16,306.93	10,324.82	3,000	100,000
	7 (civil servants)	221	18.39%	19,850.68	26,942.71	5,000	400,000
	0 (others)	125	10.44%	18,780.00	10,243.49	2,500	40,000
1929	1 (employee)	321	15.32%	10,793.75	6,323.16	3,000	60,000
	2 (empl. house law)	2	0.10%	12,500.00	3,535.53	10,000	15,000
	3 (self-employed)	382	18.23%	19,173.82	11,909.21	3,000	60,000
	4 (foreman)	312	14.89%	12,189.10	6,791.30	2,000	50,000
	5 (self-empl. foreman)	22	1.05%	13,045.45	6,343.18	5,000	30,000
	6 (salaried employee)	419	20.00%	15,687.35	8,886.32	2,000	60,000
	7 (civil servants)	429	20.48%	17,648.95	8,784.74	1,000	50,000
	0 (others)	208	9.93%	18,919.90	11,351.57	3,000	75,000

We classified all customers to their respective position in their occupations according to the scheme by Schüren (1989). The job position can then be classified as (1) employee (apprentice, journeyman, or day laborer), (2) employee under house law (servants), (3) self-employed (craftsman or freelancer), (4) journeymen or foremen, (5) self-employed foreman or factory foremen, (6) salaried employees, (7) civil servants or commissioned officers, or (0) others. We report the number of observations for each position and their frequency relative to the total number of observations. Since not all customers could be assigned to a position in the class, the frequency does not add up to 100%. Furthermore, we report the mean, standard deviation, minimum and maximum value of the contractual saving for housing contractual amounts of customers in *Reichsmark* for each position.

Table D.3: Economic Sectors and Contractual Amounts of CSH Customers, 1924-1929

	Eco. Sector	Obs.	Freq.	Mean	St. dev.	Min	Max
1924-1926	1 (farming)	9	1.56%	9,666.67	5,937.17	3,000	20,000
	2 (domestic service)	3	0.52%	14,000.00	5,291.50	10,000	20,000
	3 (craftsmanship)	31	5.37%	13,854.84	7,349.82	4,000	40,000
	4 (home trade)	-	-	-	-	-	-
	5 (industry)	83	14.56%	17,018.07	11,085.71	4,000	70,000
	6 (craftsm., home tr., ind.)	76	13.17%	14,006.58	7,913.07	2,500	40,000
	7 (banking, insurance)	39	6.93%	18,435.90	8,926	5,000	40,000
	8 (professions)	26	4.51%	23,846.15	13,000.59	5,000	70,000
	9 (civil service)	229	40.03%	15,676.86	7,687.16	2,500	60,000
	0 (others)	77	13.34%	16,467.53	8,053.41	3,000	40,000
1927	1 (farming)	42	3.48%	12,321.43	11,061.81	2,000	60,000
	2 (domestic service)	2	0.50%	20,666.67	10,250.20	12,000	40,000
	3 (craftsmanship)	64	5.31%	16,851.56	9,073.63	4,000	40,000
	4 (home trade)	-	-	-	-	-	-
	5 (industry)	141	11.69%	16,314.95	8,888.22	1,100	40,000
	6 (craftsm., home tr., ind.)	220	18.33%	11,625.45	8,355.54	2,000	90,000
	7 (banking, insurance)	94	7.79%	18,574.47	12,310.71	1,000	90,000
	8 (professions)	58	4.81%	25,448.28	10,581.63	3,000	60,000
	9 (civil service)	395	32.84%	16,340.51	8,798.43	2,000	65,000
	0 (others)	184	15.26%	18,263.59	26,793.84	2,000	350,000
1928	1 (farming)	54	4.39%	8,364.15	5,160.21	1,900	30,000
	2 (domestic service)	12	0.99%	13,500.00	6,037.76	7,000	30,000
	3 (craftsmanship)	68	5.63%	16,426.47	11,175.75	2,500	50,000
	4 (home trade)	1	0.08%	10,000.00	-	10,000	10,000
	5 (industry)	165	13.67%	14,130.30	9,041.39	2,000	50,000
	6 (craftsm., home tr., ind.)	256	21.21%	12,458.98	6,747.64	2,000	40,000
	7 (banking, insurance)	76	6.38%	19,939.47	13,624.83	4,000	100,000
	8 (professions)	74	6.13%	26,155.41	14,324.26	3,000	80,000
	9 (civil service)	338	28.09%	17,553.25	22,358.79	3,000	400,000
	0 (others)	161	13.42%	16,649.69	10,099.88	2,000	40,000
1928	1 (farming)	66	3.15%	9,750.00	6,123.25	3,000	42,000
	2 (domestic service)	24	1.15%	21,041.67	13,142.96	4,000	60,000
	3 (craftsmanship)	141	6.73%	15,652.48	9,665.10	4,000	50,000
	4 (home trade)	1	0.05%	10,000.00	-	10,000	10,000
	5 (industry)	283	13.51%	15,244.33	9,702.44	3,000	60,000
	6 (craftsm., home tr., ind.)	404	19.28%	12,024.75	6,655.24	2,000	50,000
	7 (banking, insurance)	154	7.35%	19,097.40	10,845.78	4,000	60,000
	8 (professions)	92	4.39%	24,826.09	12,638.34	4,000	60,000
	9 (civil service)	670	31.98%	16,118.51	8,485.68	1,000	50,000
	0 (others)	260	12.41%	17,009.69	11,067.57	3,000	75,000

Classification of customers and economic sectors according to the scheme by Schüren (1989). The economic sector either be (1) farming, (2) domestic service, (3) craftsmanship, (4) home trade, (5) industry, (6) craftsmanship or home trade or industry, (7) trade, banking, insurance or transportation, (8) professions, (9) civil service, church service or federations, or (0) others. We report the number of observations for each sector and their frequency relative to the total number of observations and the mean, standard deviation, minimum and maximum value of the CSH contractual amounts of customers in the respective sector in *Reichsmark*.

Table D.4: Social Classes and their Contractual Amounts of CSH Customers, 1930-1933

	Social Class	Obs.	Freq.	Mean	St. dev.	Min	Max
1930	1 (lowest lower class)	85	5.26%	9,423.53	3,385.46	3,000	20,000
	2 (middle lower class)	63	3.90%	10,222.22	4,315.93	4,000	30,000
	3 (upper lower class)	411	25.42%	12,459.85	6,834.29	3,000	50,000
	4 (lower middle class)	504	31.17%	17,320.44	9,426.71	3,000	50,000
	5 (upper middle class)	280	17.32%	16,935.71	9,503.22	3,000	70,000
	6 (upper class)	250	15.46%	22,544.00	12,859.77	1,000	80,000
1931	1 (lowest lower class)	35	4.72%	9,304.91	4,629.31	2,000	19,672
	2 (middle lower class)	32	4.32%	10,000.00	4,892.39	4,000	25,000
	3 (upper lower class)	197	26.59%	12,323.14	8,499.28	2,000	90,000
	4 (lower middle class)	235	31.71%	16,272.02	8,051.94	3,000	50,000
	5 (upper middle class)	122	16.46%	16,925.78	9,312.76	3,000	50,000
	6 (upper class)	110	14.84%	22,221.61	11,795.35	5,000	60,000
1932	1 (lowest lower class)	37	3.82%	7,824.32	3,926.79	3,000	21,000
	2 (middle lower class)	39	4.03%	9,064.10	5,815.34	2,000	25,000
	3 (upper lower class)	237	24.48%	9,594.94	5,668.50	3,000	50,000
	4 (lower middle class)	300	30.99%	13,263.33	7,152.94	3,000	50,000
	5 (upper middle class)	184	19.01%	15,875.00	8,857.75	3,000	50,000
	6 (upper class)	151	15.60%	20,811.26	11,554.18	3,000	50,000
1933	1 (lowest lower class)	57	3.56%	8,754.39	10,059.25	3,000	80,000
	2 (middle lower class)	67	4.18%	8,641.79	3,127.11	3,000	16,000
	3 (upper lower class)	459	28.67%	10,320.49	6,549.06	107	70,000
	4 (lower middle class)	524	32.73%	14,241.79	7,888.50	1,000	50,000
	5 (upper middle class)	279	17.43%	15,924.53	14,175.73	3,000	200,144
	6 (upper class)	176	10.99%	20,017.05	10,207.27	3,000	80,000

We classified all customers and their respective occupations to the corresponding social class of a job according to the scheme by Schüren (1989). The social class can either be (1) the lowest lower class, (2) the middle lower class, (3) the upper lower class, (4) the lower middle class, (5) the upper middle class, and (6) the upper class. We report the number of observations for each class and their frequency relative to the total number of observations. Since not all customers could be assigned to a social class, the frequency does not add up to 100%. Furthermore, we report the mean, standard deviation, minimum and maximum value of the contractual saving for housing contractual amounts of customers in *Reichsmark*.

Table D.5: Job Positions and Contractual Amounts of CSH Customers, 1930-1933

	Position	Obs.	Freq.	Mean	St. dev.	Min	Max
1930	1 (employee)	251	15.52%	10,705.18	5,311.94	3,000	40,000
	2 (empl. house law)	4	0.25%	10,250.00	3,500.00	5,000	12,000
	3 (self-employed)	351	21.71%	18,962.96	12,404.90	3,000	80,000
	4 (foreman)	231	14.29%	12,458.87	6,745.49	3,000	50,000
	5 (self-empl. foreman)	19	1.18%	14,210.53	7,428.02	6,000	30,000
	6 (salaried employee)	274	16.94%	15,744.53	8,750.95	1,000	70,000
	7 (civil servants)	330	20.41%	18,109.09	9,220.38	3,000	60,000
	0 (others)	157	9.71%	20,302.55	10,976.34	3,000	55,000
1931	1 (employee)	106	14.32%	9,792.69	4,718.93	2,000	25,000
	2 (empl. house law)	-	-	-	-	-	-
	3 (self-employed)	174	23.51%	17,101.28	10,202.47	3,000	50,000
	4 (foreman)	107	14.46%	13,041.89	10,075.37	3,000	90,000
	5 (self-empl. foreman)	5	0.68%	13,000.00	4,690.42	8,000	20,000
	6 (salaried employee)	140	18.92%	15,051.06	8,079.57	3,000	48,000
	7 (civil servants)	136	18.38%	18,493.17	9,674.67	2,000	60,000
	0 (others)	72	9.73%	19,294.85	9,340.94	4,000	50,000
1932	1 (employee)	148	15.29%	8,790.54	5,713.69	2,000	50,000
	2 (empl. house law)	3	0.31%	15,000.00	7,937.25	6,000	21,000
	3 (self-employed)	189	19.52%	17,703.70	12,056.47	3,000	50,000
	4 (foreman)	110	11.36%	9,881.82	5,649.93	3,000	40,000
	5 (self-empl. foreman)	9	0.93%	11,000.00	3,535.53	5,000	16,000
	6 (salaried employee)	215	22.21%	12,953.49	7,779.54	3,000	50,000
	7 (civil servants)	202	20.87%	15,517.33	7,129.64	3,000	41,000
	0 (others)	92	9.50%	15,217.39	8,433.09	4,000	50,000
1933	1 (employee)	242	15.12%	9,479.78	6,154.44	107	80,000
	2 (empl. house law)	2	0.12%	6,500.00	2,121.32	5,000	8,000
	3 (self-employed)	303	18.93%	15,945.54	10,685.97	1,000	80,000
	4 (foreman)	262	16.36%	10,541.98	7,728.89	3,000	70,000
	5 (self-empl. foreman)	22	1.37%	12,600.00	4,335.46	6,000	25,000
	6 (salaried employee)	362	22.61%	13,348.07	6,912.62	1,000	50,000
	7 (civil servants)	257	16.05%	17,081.49	14,037.68	3,000	200,144
	0 (others)	151	9.43%	15,814.57	9,113.66	3,000	50,000

We classified all customers to their respective position in their occupations according to the scheme by Schüren (1989). The job position can then be classified as (1) employee (apprentice, journeyman, or day laborer), (2) employee under house law (servants), (3) self-employed (craftsman or freelancer), (4) journeymen or foremen, (5) self-employed foreman or factory foremen, (6) salaried employees, (7) civil servants or commissioned officers, or (0) others. We report the number of observations for each position and their frequency relative to the total number of observations. Since not all customers could be assigned to a position in the class, the frequency does not add up to 100%. Furthermore, we report the mean, standard deviation, minimum and maximum value of the contractual saving for housing contractual amounts of customers in *Reichsmark* for each position.

Table D.6: Economic Sectors and Contractual Amounts of CSH Customers, 1930-1933

	Eco. Sector	Obs.	Freq.	Mean	St. dev.	Min	Max
1930	1 (farming)	63	3.90%	10,539.68	6,883.42	3,000	50,000
	2 (domestic service)	22	1.36%	14,181.82	6,623.45	5,000	30,000
	3 (craftsmanship)	102	6.31%	14,764.71	8,806.14	3,000	50,000
	4 (home trade)	-	-	-	-	-	-
	5 (industry)	257	15.89%	15,346.30	10,017.21	1,000	60,000
	6 (craftsm., home tr., ind.)	291	18.00%	12,419.24	6,770.84	3,000	50,000
	7 (banking, insurance)	124	7.67%	18,117.42	11,261.89	3,000	70,000
	8 (professions)	91	5.63%	25,395.60	13,482.40	3,000	80,000
	9 (civil service)	458	28.32%	16,864.63	8,813.86	3,000	60,000
	0 (others)	209	12.93%	17,610.05	10,761.95	3,000	55,000
1931	1 (farming)	22	2.97%	10,636.36	6,090.94	3,000	30,000
	2 (domestic service)	14	1.89%	12,714.29	5,224.63	5,000	25,000
	3 (craftsmanship)	57	7.70%	14,110.04	6,575.15	3,000	35,000
	4 (home trade)	1	0.14%	15,000.00	-	15,000	15,000
	5 (industry)	92	12.43%	14,425.89	7,905.02	4,000	40,000
	6 (craftsm., home tr., ind.)	131	17.70%	12,388.05	9,441.15	3,000	90,000
	7 (banking, insurance)	57	7.70%	14,604.03	7,856.50	2,000	40,000
	8 (professions)	56	7.57%	23,499.50	12,117.79	3,000	50,000
	9 (civil service)	216	29.19%	16,458.27	9,440.36	2,000	60,000
	0 (others)	94	12.70%	17,0300.86	9,432.39	3,000	50,000
1932	1 (farming)	20	2.07%	8,450.00	3,886.21	3,000	20,000
	2 (domestic service)	14	1.45%	15,714.29	11,932.04	5,000	50,000
	3 (craftsmanship)	59	6.10%	11,169.49	6,416.98	3,000	37,000
	4 (home trade)	-	-	-	-	-	-
	5 (industry)	158	16.32%	13,598.10	9,759.11	3,000	50,000
	6 (craftsm., home tr., ind.)	152	15.70%	9,664.47	5,460.20	3,000	40,000
	7 (banking, insurance)	87	8.99%	14,827.59	8,690.02	3,000	50,000
	8 (professions)	58	5.99%	23,844.83	13,201.28	3,000	50,000
	9 (civil service)	303	31.30%	14,136.96	7,457.07	2,000	50,000
	0 (others)	117	12.09%	13,465.81	8,269.63	3,500	50,000
1933	1 (farming)	42	2.62%	8,833.33	3,601.60	3,000	16,000
	2 (domestic service)	21	1.31%	16,857.14	13,058.66	1,000	50,000
	3 (craftsmanship)	95	5.93%	11,836.84	7,797.11	3,000	50,000
	4 (home trade)	-	-	-	-	-	-
	5 (industry)	266	16.61%	13,169.58	8,318.79	107	60,000
	6 (craftsm., home tr., ind.)	332	20.74%	10,560.84	7,216.13	3,000	70,000
	7 (banking, insurance)	136	8.49%	14,227.94	7,279.57	3,000	40,000
	8 (professions)	92	5.75%	19,652.17	11,749.62	5,000	80,000
	9 (civil service)	428	26.73%	15,044.26	11,728.70	1,000	200,144
	0 (others)	189	11.81%	14,534.39	10,113.46	3,000	80,000

Classification of customers and economic sectors according to the scheme by Schüren (1989). The economic sector either be (1) farming, (2) domestic service, (3) craftsmanship, (4) home trade, (5) industry, (6) craftsmanship or home trade or industry, (7) trade, banking, insurance or transportation, (8) professions, (9) civil service, church service or federations, or (0) others. We report the number of observations for each sector and their frequency relative to the total number of observations and the mean, standard deviation, minimum and maximum value of the CSH contractual amounts of customers in the respective sector in *Reichsmark*.

did not have enough inherited wealth to finance larger projects on their own but were also not worried about subsistence levels. On the other hand, it becomes also apparent that the financial development of contractual saving for housing also reached the higher income classes. Thus, not only lower incomes, but also more affluent customers entered CSH contracts to overcome financing barriers and to profit from the savings collective.

Furthermore, we used the data set by Hohls & Kaelble (2001) to get a grasp on the general population distribution in Weimar Germany. Unfortunately, this data does not allow for a distinction between social classes as with the methodology according to Schüren (1989). Nevertheless, we can look at the different economic sectors or industries¹⁹ and draw a comparison to our hand picked data. The time span is also slightly different but captures mainly the same time periods as in our CSH data set. Figure D.8 shows the frequency of different industries within the whole working population of Weimar Germany.

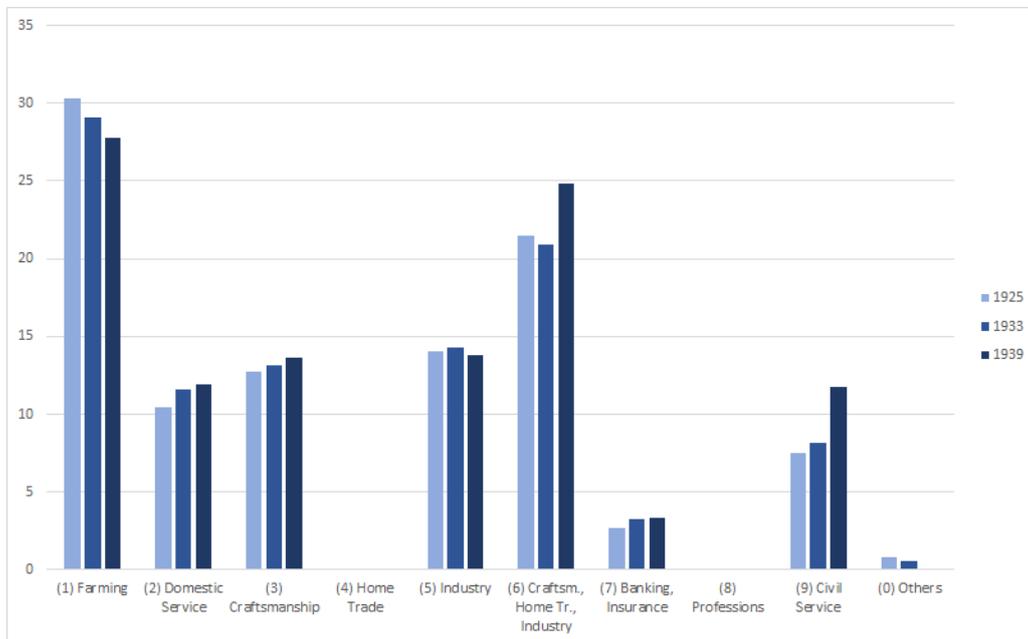


Figure D.8: Frequency of economic sectors within the working population in Weimar Germany, 1925-1939

This graph shows the frequency of economic sectors within the working population of Weimar Germany in percentage terms for the years, 1925, 1933, and 1939 based on the data set by Hohls & Kaelble (2001). The economic sector can either be (1) farming, (2) domestic service, (3) craftsmanship, (4) home trade, (5) industry, (6) craftsmanship or home trade or industry, (7) trade, banking, insurance or transportation, (8) professions, (9) civil service, church service or federations, or (10) others. To reach the same classification across both data sets we grouped the industry by Hohls & Kaelble (2001) of farming into the Schüren sector (1); social services and personal services in sector (2); clothing industry and construction in sector (3); chemical industry, food industry, and other industries in sector (5); mining, metal works, and trade in sector (6); retirement and payment services and production services in sector (7); and transportation and civil service in sector (9).

¹⁹The categorization according to Hohls & Kaelble (2001) is slightly different to the sector classification of Schüren (1989). Thus, we had to assign the industries by Hohls and Kaelble to our main sectors by Schüren. Specifics on this procedure are given in the caption of Figure D.8.

In comparison to our hand-picked data of CSH customers, farming has a much greater weight in the general working population of Weimar Germany. Similarly, the civil service grows in importance over the years but is much less dominant than in our CSH data set. Possible explanations for those two points will be discussed later. The frequencies of the industrial sector and craftsmanship is slightly higher than for the CSH sample but the relative importance of sectors (3), (5), and (6) are comparable across both data sets.

Since the geographical dispersion of CSH customers shows notable differences between regions, we also included data on the frequency of sectors in the whole working population for different parts of Weimar Germany in Figure D.15 in the Appendix. Quite interestingly, the regions of Württemberg and Baden have a relatively high share of farming. This is in stark contrast to the high prevalence of CSH customers there which are only rarely from the farming sector. Naturally, the metropolitan area of Berlin shows almost no farming. The sectors of industry and craftsmanship are relatively dominate for all regions, most notably of course in the industrial regions of the Rhineland and Thuringia. Similarly to the working population for the whole of Weimar Germany, the share of civil servants is much lower than for the sample of CSH customers.

A last point that stands out is the bigger share of the domestic service for the general working population in comparison to our CSH sample. This might be due to the greater number of workers in domestic services in the Prussian regions.

The data set by Hohls & Kaelble (2001) also offers insights into the job positions of workers in the general labor force. However, similarly to the case for economic sectors, the data is much less detailed than the classifications by Schüren and only distinguishes between the self-employed, salaried employees and civil servants, and workers. Thus, a comparison to our CSH data is more difficult but, when we aggregate job positions to these three categories, it also becomes present that civil servants are much less represented in the general working population than in our CSH data while general employees have a higher share. A visualization of this part of the data is not reported due to space restrictions but available on request.

In summary, these few examples show that our distribution of CSH customers does not simply replicate the general population distribution in Weimar Germany. By looking at the data by Schüren (1989) and Hohls & Kaelble (2001), we see distinct differences between the general working population and our sample of CSH customers. However, as mentioned above, our analysis remains purely descriptive in this paper and we do not claim to draw causal interpretations for the causes behind these. Nevertheless, we want to offer some theoretical considerations for CSH being a form of financial development and give some speculative arguments on the possible causes for the geographical and social dispersion of CSH in the following chapter.

D.5 CSH and Financial Development

As we have seen with the distribution of CSH across social classes in Weimar Germany, especially the upper lower class and the middle classes used this combination of a saving and loan contract quite frequently. New financial products, such as CSH, constitute a form of financial development, since they reduce financing constraints for economic agents without or with only a small initial endowment of wealth (in our case with respect to the access to housing finance). We might expect such financing constraints specifically in the social classes mentioned above. With regard to the relationship between such financial developments and the general economic situation, the literature discusses both a demand following and supply-leading hypothesis. The first view, by, e.g., Robinson (1952), states that a growing economy also has a growing need for output which has to be financed by more investments and more financial services. According to this hypothesis, banks and other financial institutes follow economic growth. The supply-leading hypothesis, by, e.g., Schumpeter (1969), McKinnon (1973) or Miller (1998), states that financial innovations come first and enable people to fulfill their entrepreneurial ambitions, what then benefits economic growth. Similar arguments can be found in Galor & Zeira (1993), Galor & Moav (2004) or Banerjee & Newman (1993). This strand of the literature shows that financial development can reduce credit constraints, with a positive impact on the investments of poorer people in human capital. Greenwood & Jovanovic (1990) add an inverse U-shape of the relationship between financial development and economic growth. According to their model, individuals are willing to invest more money into risky economic activities if they have access to financial intermediation to diversify risk.

Presumably, financial developments might involve both effects. However, in the historical perspective covered in this paper we do not see any potential for reverse causality and argue in the direction of the demand-leading hypothesis. Before the establishment of building societies, many savers had only insufficient funds to tackle big and long-lasting investments such as building a house. Nevertheless, there was strong demand for residential property and its financing that was not covered otherwise by the existing credit institutions or by state subsidies. As Clingan (2000) describes in his work, the state tried to offer some relief with subsidies and other policy actions which were ultimately not enough. The unmet demand can be seen as the main driving force for the establishment of the concept of contractual saving for housing and building societies and the ensuing market penetration.

Like in Greenwood & Jovanovic (1990), customers formed a collective and bundled their funds. Building societies appear as financial intermediaries that help their customers to diversify against the risks of saving and borrowing over a long period of time. The most prominent risk are fluctuations in the interest rate, as CSH will both fix and smooth

the regular liability from their housing project.²⁰ Due to the special contractual structure and reputational concerns, we can also argue that CSH banks might be willing to grant loans for housing even in situation where other banks might prefer to invest money into different business areas.²¹ Thus, CSH can also be understood as a means to reduce the risk of availability of loans.

A next argument is linked to the characterization of contractual saving for housing as relationship lending. The German financial system is characterized by a comparatively large number of small and independent financial institutions. Stein (2002) argues that small banks, compared to larger institutes, are superior in utilizing soft information. In many cases, small banks might be closer to their customers, both geographically and maybe also with regard to the supported values (Cohn et al. 2014, Maurer 2019). Furthermore, soft information is difficult to transfer within larger hierarchies, thus it might be difficult or even dangerous for agents within the hierarchy to base their decisions on such unverifiable information. Empirical evidence, e.g., by Alessandrini et al. (2009) or Berger et al. (2005), shows that small firms suffer from banking consolidation and the resulting increased distance to their bank. More decentralized banking systems also boost economic growth within the different regions and reduce inequality (Burghof et al. 2020).

From a principle-agent theory point of view, the majority of contracts often do not include clauses for all possible scenarios. This results in incompleteness due to transaction costs as the contracting parties might not be able to describe all future states of nature *ex ante* (Williamson 1979, Hart & Moore 1999) or the disability of agents to correctly forecast future payoffs (Maskin & Tirole 1999). A possible solution are then long-term relationships between customers and banks with credible punishments to prevent deviation from the implicit contractual agreement (Radner 1981, 1985). This is just the case with CSH what represents a very special version of relationship banking. Compared to other small banks in Germany, CSH banks are often relatively large and super-regional in their activities. However, they also enter into long-term relationships with their customers. Those long-term contracts help to circumvent the uncertainties of various states of nature that result from different payoff options due to a combined savings and credit phase but cannot all be explicitly put into the contract *ex ante*. But as CSH banks get to know their customers and their savings behavior over the long time between signing the contract and being eligible for payment, they might implicitly guarantee them to receive their loan at the agreed upon time. Additionally, they might also show some leeway when customers

²⁰In the recent past, customers used this protection against falling interests in the persistent environment of very low or even zero interest rates in the Euro zone. They did not apply for a loan with their bank for contractual saving for housing but wanted to use their CSH contract as an opportunity to save. In Germany, this resulted in legal battles, when banks for contractual saving for housing started canceling these contracts (e.g. the ruling in favor of building societies by one of the highest German courts, BGH Az. XI ZR 185/16, <http://juris.bundesgerichtshof.de/cgi-bin/rechtsprechung/document.py?Gericht=bgh&Art=en&sid=c2689fadbd961e309608ed3ab24e4e69&nr=78060&pos=0&anz=1>).

²¹For more on that see Burghof et al. (2018).

miss on payments but otherwise have good savings track records.

In line with this argumentation, Petersen & Rajan (1994) show that the availability of credit is positively linked to the time clients spend in a connection with one bank. In the case of CSH, the banks get to know their customers well through the long-lasting relationship starting with a - from the bank's perspective - riskless savings phase. In general, we can expect that the long-term relationship and the long-term observation of the savings and payment can enhance the banks' screening capability (Elsas 2005). However, note that the conditions of CSH contracts explicitly link the granting of a loan to the preceding savings behavior, allowing the easiest access to a loan to regular savers. In this sense, the contracts even contain an element of self-selection.

In an ideal case, such relationships are reciprocal. In his paper, Sharpe (1990) argues that relationship lending is particularly valuable if banks cannot fully exploit their informational advantage from the single financing contract, as the information rent drawn from the customers would effectuate both ex-post underinvestment and, given a competitive financing market, ex-ante overinvestment. Arguing along the lines of the Folk theorem, he shows that in a multi-period setting such superior equilibria can be realized if potential customers can effectively identify stigmatized banks that deviate from this implicit code of conduct. Through their co-operative traditions and restricted business model, German building societies are well placed to follow such a code of conduct in a transparent and creditable way. On the downside, they have to cope with severe criticism whenever they deviate from the behavior clients deem to be in line with expectations.²² However, in general, clients believe that building societies support their housing projects in a constructive way and do not only maximize their short-term profits.²³

Finally, the general arguments in favor of financial intermediation from the delegated monitoring approach (Diamond 1984, 1996, Boot & Thakor 2000) also apply to CSH banks. However, the monitoring relationship might be somewhat less intensive due to the limited scope of the relationship and the fact that the loans are collateralized, which reduces the incentives to monitor the clients themselves.

Summing up, contractual saving for housing can be seen as a prime example of financial development. By acting as financial intermediaries in long lasting credit relationships, banks for contractual saving for housing can generate and utilize information about the creditworthiness of their customers and reduce information asymmetries. This way, capital constraints are reduced, and the capital allocation is improved. That explains why especially the financially restricted lower and middle classes opted for CSH. In the follow-

²²Such a situation occurred in the 1970's, when, due to the slackening savings activities, CSH banks were not able to provide loans as timely as expected. More recently it was the case when, due to the persistent low interest rates, old CSH contracts with higher interest rates became a threatening burden as clients used the embedded options to maximize interest income, and the banks had to find ways to abandon these contracts.

²³A survey by Statista (2013) in Germany showed, that most customers still trust CSH banks more than other financial institutions such as conventional banks or insurance companies.

ing, we will offer more arguments for the possible causes behind the dispersion of CSH customers in our sample.

D.6 Possible Causes for the Historical Development of CSH

After the descriptive analysis of our novel data set on CSH and considering the basic literature on financial development, we now focus on possible reasons for these developments. It is important to note that we do not draw causal interpretations and rather speculate on the dispersion of CSH. An econometric investigation into the causality between macro- and socioeconomic factors and their effects on CSH poses scope for further research.

A first insight of our descriptive analysis was that CSH is very much centered in the South-West of Weimar Germany in the states of Württemberg, Hohenzollern, and Baden. To some degree this can be attributed to the fact that the first building society was founded (and is still based) in this region. However, the concept might also have had a special cultural appeal to its inhabitants. Even nowadays, the population of the German South-West, especially the Swabians of today's Württemberg, are said to have a strong propensity to build houses and to reach for homeownership (Koch 1986). Today, three of the four biggest German building societies are located here, the customers of these regions sign the highest CSH amounts, and we observe in today's state of Baden-Württemberg a number of CSH customers per 1,000 inhabitants of 424 in comparison to the average of 325 in the other German states (Braun & Henkes 2019).

Secondly, we find a higher number of CSH customers in bigger cities and metropolis. To some degree, this concentration is due to the higher population density in these regions. However, the general shortage of residential real estate and the connected demand for it was particularly strong in the cities, since workers still pushed from the surrounding rural areas into the cities to work in factories. The cities also reported a comparatively low homeownership rate, which might have provoked a backlock demand for the means to realize and finance respective housing projects.²⁴ Thus, despite its rural origins of the first building society, much of its business soon centered around the urban areas of Germany.

A third observation is the low frequency of CSH customers in the lowest classes of society. This might be the case because the people in these classes have very little or even no income for saving purposes. Most of their income goes directly into ensuring subsistence, and they are not able to build a savings stock or wealth, even within a building society. Therefore, contractual saving for housing is just not possible for them.

²⁴In general, low homeownership rates in comparison to other countries are a prominent characteristic of the German housing market even today. The homeownership rate in Germany is around 40%, the European average roughly at 65%. With European data for the years 2004 to 2006, Voigtländer (2009) identifies four reasons for this: high rental rates due to an extensive rental housing market, lower subsidies on homeownership than in other European countries, the German rental housing market was not damaged by excessive interventions in rents as in other European countries, and relatively stable house prices over a long period of time.

Meanwhile, a potential explanation for the high CSH prominence in the middle classes might be that the middle class was severely hit by hyperinflation, and their initial savings were destroyed. Furthermore, especially small and affordable real estate was not present after the war, since only insufficient construction was done and financing for it was limited, thereby increasing the housing shortage for the lower and middle class (Clingan 2000, Gehlen 2015). Consequently, their demand for real estate loans was especially high, but could not be covered by alternative means (Müller 1999). As described above, some state aid for financing housing was instated, but this was insufficient, while the conventional banks were also suffering from hyperinflation that dwarfed the value of their deposits. Additional state measures such as rent controls further limited the scope for private building opportunities. Thus, customers from the middle class looked for new forms to finance their housing projects, e.g., by entering a savings collective through CSH banks. Additionally, as mentioned above, the shortage for housing was more pressing for the lower and middle classes, since construction was not focusing on the type of housing these people needed, i.e., small and affordable homes for lower incomes (Clingan 2000, Gehlen 2015).

A fourth important point is the predominance of civil servants among CSH customers. One possible explanation for this might be their historical savings behavior. As loyal citizens and servants to the (Prussian) state they mainly bought imperial state treasuries (*Reichsanleihen*) instead of diversifying their investments (Hawes 2017). One might even argue, that the social security reforms initiated by Chancellor Otto von Bismarck crowded out private savings and increased the reliance on state savings plans (Lehmann-Hasemeyer & Streb 2018). After the German defeat in World War I and the ensuing political and economic turbulences, the claims against the German state were nullified by hyperinflation. Savers in state bonds lost everything. Furthermore, at least for a subsample of civil servants from Baden, Selgert (2013) found that their incomes, once amongst the highest within the social strata, were decreasing relative to the general income distribution already since the second half of the 19th century. Thus, civil servants combined a relatively high social status, and a respective demand for housing, with little capital and a modest income, and might therefore be particularly keen on concepts to overcome the ensuing financial constraints.

Most importantly, even through the beginning of the 1930s, CSH remains a very attractive tool of saving and financing for civil servants. This amenity could also be attributed to the fact that they earn a relatively safe and stable income, and are therefore well positioned to enter into long-term relationships and continuously pay into their CSH contract. Thus, civil servants might find it more attractive to enter into CSH contracts than other prospective clients with fluctuating incomes and a less continuous form of employment. To some degree the same argument also holds for the many widows and retirees in our data, insofar as many within this group might have lived on some form of

permanent income or rent.

A fifth point which we already mentioned above is the markedly lower presence of contractual saving for housing in the historical core regions of Prussia, namely Brandenburg, Silesia, and East-Prussia. The city of Berlin is an exception, probably due to its metropolitan character. As stated before, cities had more severe shortages of housing from the industrialization and inflow of factory workers, and CSH was consequently used more heavily in urban areas. The remainder of “old” Prussia,²⁵ on the contrary, consisted of mainly rural regions. Prussian society was historically dominated by rich landowners that formed a relatively rich aristocracy, whereas the rest of the inhabitants were comparatively poor and dependent farmers and peasants (Clark 2007).

Evidently, the Prussian aristocracy as upper class was less likely to save within a CSH collective. The farmers at the other end of the social ladder were presumably too close to the subsistence level and could not save into a CSH contract, whereas the middle class might not have been sufficiently large for much dynamics in contractual saving for housing. However, the allocation of wealth within a society is generic. On a more general level we can argue that a society in which a very small fraction of the population, e.g., a class of landowners, holds all the wealth and political power, may not be the ideal environment for common private investments, even if the property rights of this elite are secure. The concentration of political and social power in the hands of a small elite implies that the majority of the population risks being held up by the powerful elite after they undertake investments (La Porta et al. 1997, 1998). This then works against the development of financial intermediation and savings collectives and, thus, reduce the number of customers entering into a CSH contract.

This argument is in line with the institution hypothesis for economic growth by Acemoglu et al. (2002): societies that provide incentives and opportunities for investment will be richer than those that fail to do so. This literature stresses the importance of institutions and culture in shaping financial development and ultimately economic growth (Olsen 2000). Liberal states with a more equal income distribution might be more prone to investments and to financial innovations, such as contractual saving for housing. They can take up the opportunities offered by these financial products and generate economic welfare, while the more oppressive and authoritarian civil servant state of Prussia hindered financial development by its inherent institutions and its restrictive culture.

However, another argument for the low presence of CSH in rural areas of Germany would be that farmers tend to keep their excess funds out of banks for investing in land and equipment. Schuster et al. (2019) show that the usage of postal banking services in the U.S. in the 1920s and 30s was more prominent among the urban population while

²⁵Prussia gained control over much of the provinces along the Rhine and in Pomerania after the Congress of Vienna in 1815. It expanded further by integrating the Kingdom of Hanover and of Hesse and several other regions after the Austro-Prussian war of 1866 (Clark 2007, Rothenbacher 2002).

farmers used neither rural banks nor postal savings. They preferred to keep their funds "under their mattress" to invest directly into their farming operation, without need of financial intermediaries. Since CSH is also an alternative to traditional financing, this could explain the high number of CSH customers in urban areas and the low frequency in rural areas such as the Prussian heartland. The argument is strongly supported by the low overall percentage of the farming sector among our sample of CSH customers (see, e.g., Figure D.13 or Tables D.3 and D.6). Nevertheless, a high degree of farming in a region does not correlate with low levels of CSH, as we saw for the sectoral data by Hohls & Kaelble (2001) for the regions of Württemberg and Baden. Those regions were quite rural with many farmers but still have the most CSH customers. This might be even stronger evidence for CSH penetrating the whole society and reaching those faced by financing constraints.

Interestingly, just being a Prussian territory does not correlate with a lower presence of CSH customers. The more recent Prussian acquisitions, the Rhine provinces, Northern Germany, Silesia, and Hesse, show relatively high numbers of CSH customers with a similar distribution as in the home markets in South-West Germany. One reason for that might be the inherently different social and economic conditions in these regions. In the 19th century, the Rhine provinces had become an economic power house. Its industries developed along the path set by the industrialization in the UK, and its trade focused on France and the UK (Cinnirella & Streb 2017). Thus, the Rhineland was oriented towards the western democracies, and more open to the world than the Prussian core state. Silesia and Thuringia were similarly strong from an economic perspective (Lehmann-Hasemeyer & Wahl 2017). These business interests fostered more open cultural characteristics that also allowed for an easier adoption of financial innovations, in particular if these contain an element of self-help and self-organization.

Overall, these findings confirm our initial descriptive findings. Members of the upper lower class and middle class, and their respective occupations and economic sectors, are financially constraint and take up the opportunity of contractual saving for housing to save collectively. Their incomes placed them sufficiently above the subsistence level to allow saving activities, but they nevertheless faced severe financial constraints for larger investments. Contractual saving for housing helped in alleviating these barriers and, therefore, can be identifies as a form of financial development by advancing financial intermediation and complementing financing opportunities, in addition to loans by conventional banks and as a valid substitute for massive state subsidies.²⁶

²⁶The last argument appears in different light if we take into account that, e.g., in the U.S., two state sponsored agencies, the Federal National Mortgage Association ("Fannie Mae") and the Federal Home Loan Mortgage Corporation ("Freddie Mac") support housing finance through their massive business activities on the secondary loan market. These operations make them the largest and the fourth largest U.S. company by total assets, and expose the state to severe financial risk in case of a general housing crises (Wallison & Calomiris 2009, Frame et al. 2015, Jaffee 2003).

D.7 Conclusion

Contractual saving for housing is one of the major sources of housing loans in Germany and in several other countries in Continental Europe. In Germany, the concept was developed in the early 1920s. Our descriptive analysis shows that CSH as a new form of financial development spread from Southwest Germany across the whole Weimar Republic. While the origins lie in Württemberg, Hohenzollern, and Baden, especially the industrial regions of the Rhineland and Thuringia are strongholds of CSH customers. An interesting fact is the comparatively low presence of CSH customers in the historical core territories of Prussia in East-Germany. However, the sole fact of being a Prussian territory as such does not reduce the usage of CSH. The evident demand for this form of financing was kindled by weak alternative financing sources in the established banking system which was still struggling with the detrimental impacts of war, political unrest and hyperinflation. The fact that a weak state could only provide insufficient subsidies for housing investments spurred demand even further.

Through contractual saving for housing, the financially constrained upper lower and lower middle class formed savings collectives to overcome credit barriers and render building activities possible that otherwise could not have been financed. We observe that CSH is also frequently used by members of the upper class, whereas the poorest strata of the society could not save. Civil servants represent the majority of customers, however with a decreasing share over the years until 1933. Other large groups of clients can be found among the self-employed and salaried workers.

So far, our analysis does not allow for causal interpretations. Nevertheless, we can speculate on possible causes for the development of CSH described above. While the predominance of the lower and middle classes among CSH customers points at clear signs for financial development and the overcoming of financing restrictions through a savings collective, the low frequency of CSH customers in Prussia might have more diverse reasons. This observation and the general geographical dispersion of CSH could be due to inherent cultural and economic differences between the industrialized part of Germany mainly in the West, and the Prussian agrarian East. We argue that the agrarian society of “old” Prussia, combined with an authoritarian civil servant state, might be less supportive to financial development than the industrial and more liberal states and regions in the West and South. Thus, our observation can also be understood as a starting point for the further discussion on the potential causalities between institutions, culture, and financial development. A in-depth econometric analysis and the formulation of research hypotheses offers scope for further research.

Acknowledgement and Archive Collections

We are grateful to the *Wirtschaftsarchiv Baden-Württemberg* for providing us with the historical documents and in helping us with the digitalization. The records can be found under the signature **WABW B 90** at the archive.

D.8 Appendix for Chapter D

D.8.1 Additional Figures

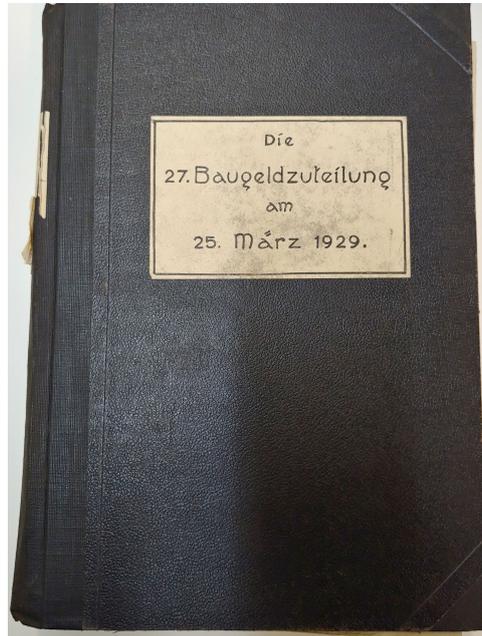


Figure D.9: A typical ledger of documents regarding contracts for contractual saving from the year 1929.

Die anlässlich der Baugeldverteilung vom 25. März 1929 zugewiesenen österreichischen
kinderreichen Bauparr.-

Bsp. Nr.	Name	Beruf	Wohnort	Schl.-Zahl	Kinder-zahl	Bsp. Summe	Einbzw. %	Zuschuss
<u>Jahresgruppe 1926, erforderlich 16,77%</u>								
321	Öggg, Michael	Tab. Trafikant	Salzburg	89,69	5	15.000.-	19,40	100.-
1454	Hilfsbrand, Jos.	Maurer	Strobl	95,13	13	8.000.-	18,73	100.-
1556	Tastl, Johann	Marktfirant	Zwetzl	61,56	8	10.000.-	18,71	100.-
						S. 33.000.-		S. 300.-
<u>Jahresgruppe 1927, erforderlich 20,14%</u>								
2273	Eder, Michael	Fagnermstr.	St. Johann	69,61	5	15.000.-	19,97	100.-
2955	Dorn, Alois	Leurer	Salzburg	66,22	5	35.000.-	20,75	100.-
2820	Sturm, Gebhard	Weichensteller	Bankweil	63,31	6	20.000.-	20,59	100.-
3456	Häfer, Josef	B. Beamter	Hatschberg	67,14	4	20.000.-	22,29	100.-
3759	Helleport, Maria	Witwe	Marzell	70,98	5	25.000.-	24,92	100.-
						S. 115.000.-		S. 500.-
						insgesamt S. 148.000.-		S. 800.-
						= RM. 88.800.-		= RM. 480.-

Ludwigsburg, den 25. März 1929.

Pg.

Figure D.10: A table recording all contracts for contractual saving ready for a loan assignment from the ledger for 1929.

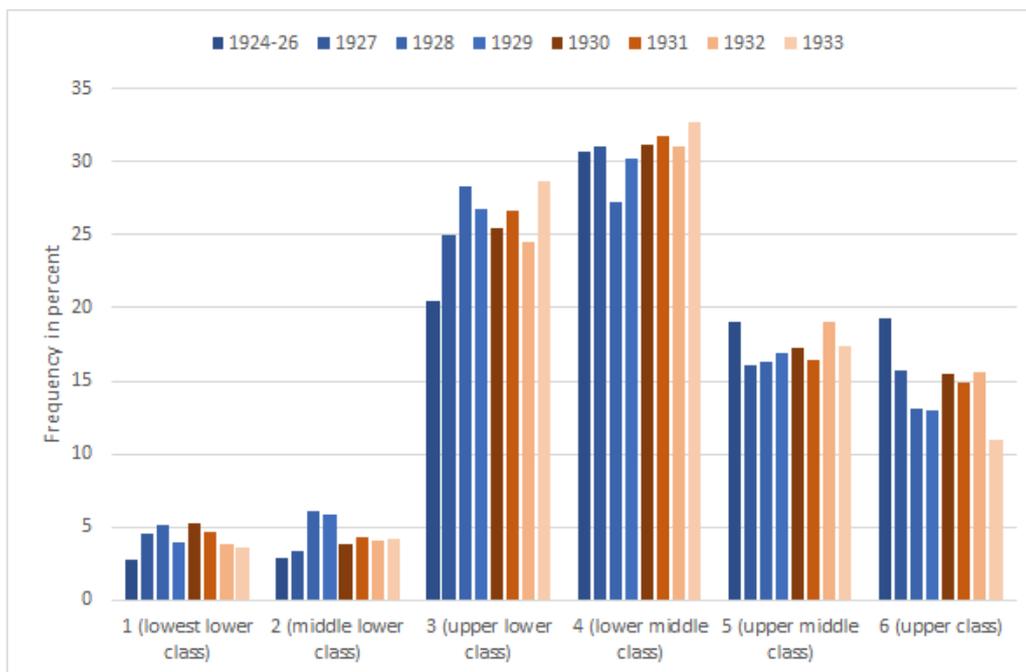


Figure D.11: Development of the frequency of CSH customers in different social classes across time, 1924-1933

We classified all customers and their respective occupations to the corresponding social class of a job according to the scheme by Schüren (1989). The social class can either be (1) the lowest lower class, (2) the middle lower class, (3) the upper lower class, (4) the lower middle class, (5) the upper middle class, and (6) the upper class. We report the frequency for each class in percent. Since not all customers could be assigned to a social class, the frequency does not add up to 100%.

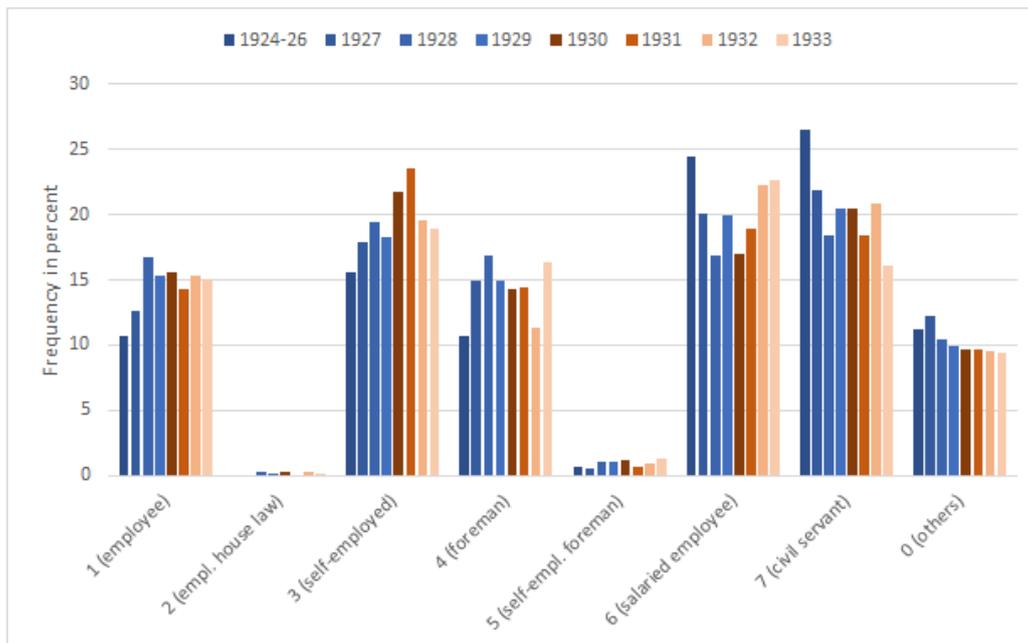


Figure D.12: Development of the frequency of CSH customers in different job positions across time, 1924-1933

We classified all customers to their respective position in their occupations according to the scheme by Schüren (1989). The job position can then be classified as (1) employee (apprentice, journeyman, or day laborer), (2) employee under house law (servants), (3) self-employed (craftsman or freelancer), (4) journeymen or foremen, (5) self-employed foreman or factory foremen, (6) salaried employees, (7) civil servants or commissioned officers, or (0) others. We report the frequency for each position in percent. Since not all customers could be assigned to a position in the class, the frequency does not add up to 100%.

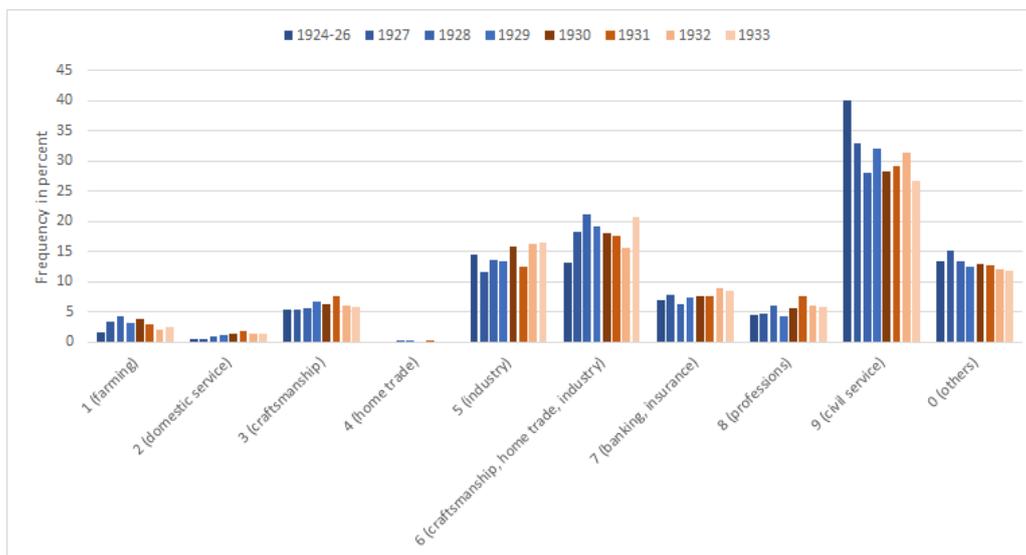


Figure D.13: Development of the frequency of CSH customers in different economic sectors across time, 1924-1933

We classified all customers and their respective occupations to the economic sector of these jobs according to the scheme by Schüren (1989). The economic sector either be (1) farming, (2) domestic service, (3) craftsmanship, (4) home trade, (5) industry, (6) craftsmanship or home trade or industry, (7) trade, banking, insurance or transportation, (8) professions, (9) civil service, church service or federations, or (0) others. We report the frequency for each sector in percent. Since not all customers could be assigned to an economic sector, the frequency does not add up to 100%.

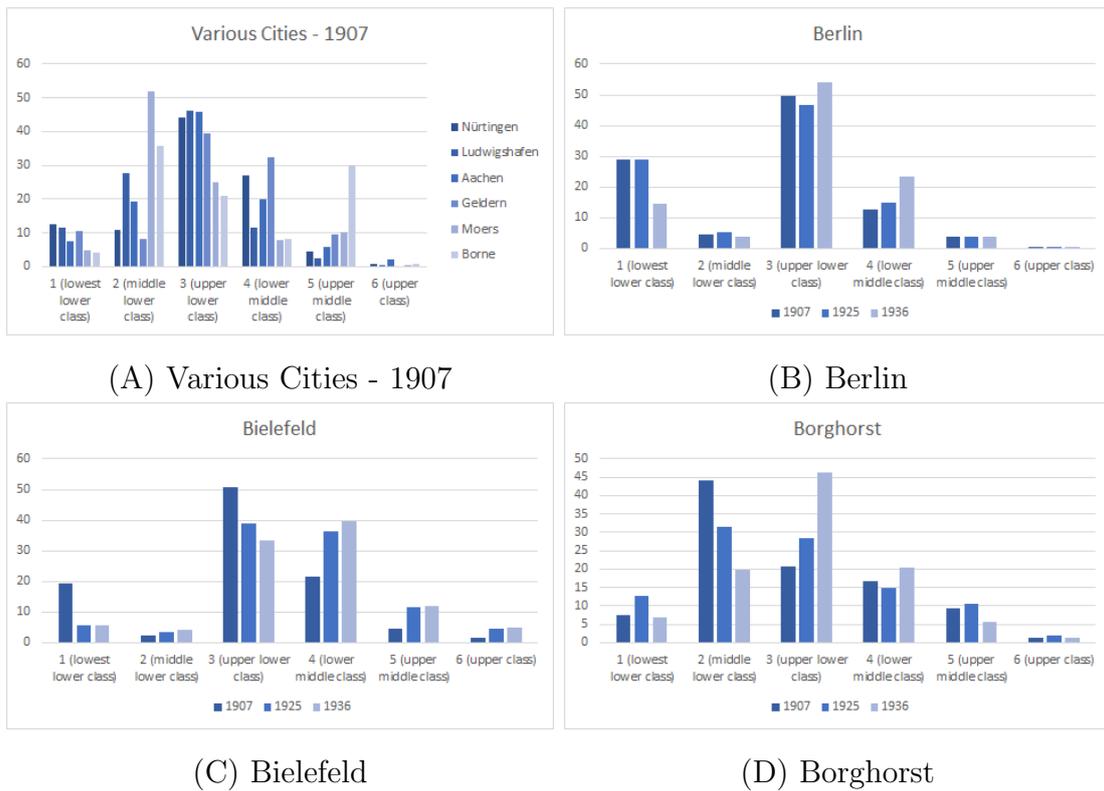


Figure D.14: Social Classes of the General Population of a Selection of Cities in Weimar Germany

Source: Schüren (1989). The social class can either be (1) the lowest lower class, (2) the middle lower class, (3) the upper lower class, (4) the lower middle class, (5) the upper middle class, and (6) the upper class. We report the frequency of each class in percent.

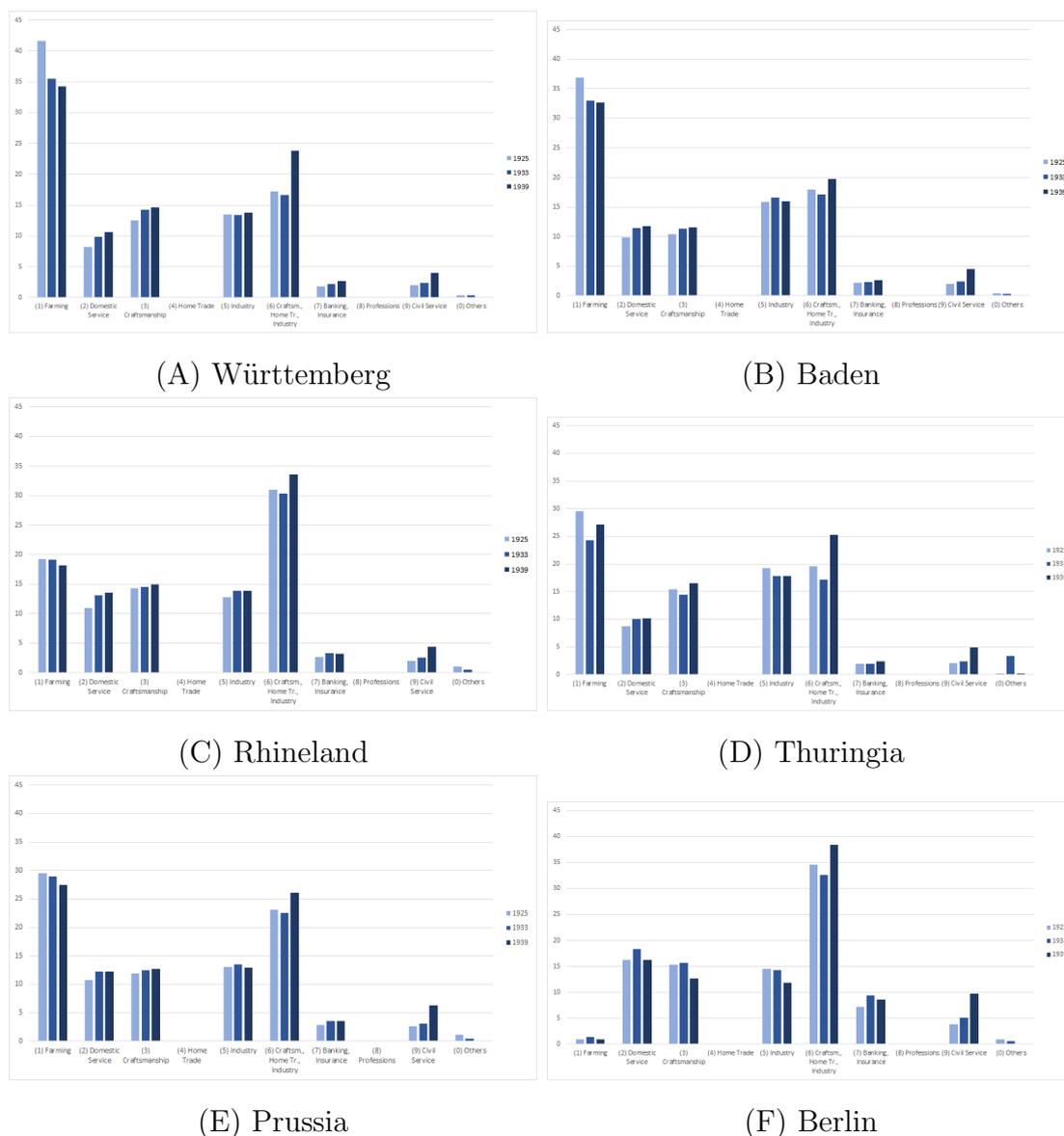


Figure D.15: Frequency of economic sectors within the working population for selected regions in Weimar Germany, 1925-1939

This graphs shows the frequency of economic sectors within the working population for of Weimar Germany in percentage terms for the years, 1925, 1933, and 1939 based on the data set by Hohls & Kaelble (2001). The data is restricted to regions of (A) Württemberg, (B) Baden, (C) the Prussian Provinces in the Rhineland, (D) the Free State of Thuringia, (E) Prussia, and (F) Berlin. The economic sector can either be (1) farming, (2) domestic service, (3) craftsmanship, (4) home trade, (5) industry, (6) craftsman-ship or home trade or industry, (7) trade, banking, insurance or transportation, (8) professions, (9) civil service, church service or federations, or (0) others. To reach the same classification across both data sets we grouped the industry by Hohls & Kaelble (2001) of farming into the Schüren sector (1); social services and personal services in sector (2); clothing industry and construction in sector (3); chemical industry, food industry, and other industries in sector (5); mining, metal works, and trade in sector (6); retirement and payment services and production services in sector (7); and transportation and civil service in sector (9).

D.8.2 Additional Tables

Table D.7: Summary Statistics on the CSH Data and Contractual Amount, 1924-1933

Year	Obs.	Contractual amount		
		Mean	Minimum	Maximum
1294-1926	871	16,375.81	1,500	250,000
1927	1,328	16,645.34	1,000	350,000
1928	1,298	16,375.14	1,900	400,000
1929	2,252	15,796.67	1,000	75,000
1930	1,710	16,332.16	1,000	80,000
1931	836	15,672.94	2,000	100,000
1932	1,204	14,147.01	2,000	120,000
1933	1,708	13,773.27	107	200,144

The contractual amount is given in *Reichsmark*.

E General Conclusion

The goal of this thesis is to get a deeper understanding of the link between financial development and economic growth and income inequality. While the majority of the existing literature looks at standard variables of financial development and common examples for real-world events of financial liberalization, the projects presented above take a different approach.

In the first paper, we move away from the extensively researched natural experiments of financial development of bank branch deregulation in the U.S. and foreign bank entry into the Indian financial system and investigate a far less researched example of financial integration, namely the introduction of the Single Banking License in 1993 in the European Union. This banking passport enables the free branching of European banks into other member states of the European Union. To investigate the effects of this financial integration in the EU, we do not rely on specific opening dates of bank branches but rather on a fundamental change in the competitive environment of the European financial system.

The results show that this form of financial development increases economic growth or wealth in the European Union and that especially less-developed nations and the bottom income groups gain from liberal financial markets. Less developed member states of the EU can further benefit on the labor market and put more people into work. It might be that research so far avoided this natural experiment of financial development since it is potentially difficult to disentangle the actual effects of financial development from the consequences of overall EU harmonization. We are quite confident that we succeeded in this separation of financial development from EU integration as a subsample of only countries that entered the EU before 1993 confirms our results. Thus, we can conclude that countries actually benefit from financial development and not just from the European integration in general. By using a difference-in-difference analysis, we argue in favor of the supply-leading hypothesis of financial development that economic agents gain from better loan supply and a more efficient credit allocation.

The second paper then used alternative variables of financial development with a greater focus on the micro-economic channels of economic agents' access to financial services. I used the number of bank branches, accounts, and ATMs for a global data set to analyze the effects of financial development and liberalization on economic growth and inequality. The positive effects of finance on growth is unambiguous in contrast to the results with income inequality as dependent variable. Long-run results captured by cross-sectional data suggests a negative effect of financial development on income inequality, while short-run estimations done with panel techniques suggest a narrowing of the income distribution. The results for these very granular financial development indicators show that access to financial services raises the incomes of the poorest in the short run while the effect wears off over time. Causality is again in line with the supply-leading hypothesis

and the works by Claessens & Perotti (2007) or Hakenes & Schnabel (2010). Access to financial services and ultimately equality of opportunities are major points when trying to reduce inequality. At the same time, it is important to prevent powerful elites which exploit bad institutions and capture all benefits from financial development for themselves. Meanwhile, the variable of ATMs may lack importance for major investments in business opportunities and education but is, nevertheless, a good indicator for whether there is financial access at all and how well the financial participation spreads across a country. The sole possibility to easily access financial services and credit at various places independent of bank branches and whether you are at your home bank improves the credit allocation and reduces inequality in the short run. Thus, this project very well complements the previous research on macro-variables of financial development such as private credit.

While the first two parts of this dissertation investigated current phenomenons of financial development, the third research project looked at access to credit and financial services from a historical perspective and gives descriptive evidence for an early form of financial development.

With historical documents from the *Wirtschaftsarchiv Baden-Württemberg*, we show that contractual saving for housing as a new form of financial development spread from Southwest Germany across the whole of 1920s and 30s Germany. While the origins lie in Württemberg, Hohenzollern, and Baden, especially the industrial regions of the Rhineland and Thuringia are strongholds of CSH customers. Interestingly, the presence of CSH customers in the historical core territories of Prussia in East-Germany is relatively low. We add to the discussion of causality between finance and economic development with this project and in contrast to the first two papers argue for the demand-following hypothesis. The demand for CSH was kindled by weak alternative sources for housing finance in the established banking system which still struggled with the negative impacts of war, political unrest and hyperinflation. The fact that a weak state could only provide insufficient subsidies for housing investments increased demand even further which was then serviced by building societies and the financial innovation of CSH.

As a result, this thesis shows that there is not one truth to the link and causality between finance and growth or inequality. While the examples of European financial integration and access to finance through ATMs shows that the supply of financial opportunity matters, the historical analysis of CSH gives also evidence for finance following an apparent demand and filling a gap in the credit allocation. Thus, we find evidence for both hypotheses. Finance spurs economic development but also follows the demand for financing when certain services are missing in an economy. As many things in life, the question of causality for the finance-growth nexus is multifaceted and depends on the actual circumstances and the situation of the economy as a whole.

When looking at the social and occupational classes in Weimar Germany, we show that the financially constrained upper lower and lower middle class formed savings collectives

to overcome credit barriers and to make building activities possible that otherwise could not have been able to be financed without CSH. We observe that CSH is also frequently used by members of the upper class, whereas the poorest strata of the society could not safe under any circumstances. Civil servants represent the majority of customers, however with a decreasing share over the years until 1933. Other large groups of clients are the self-employed and salaried workers.

The analysis in the third paper is not causal, but we, nevertheless, can speculate about possible causes for the development of CSH. While the predominance of the lower and middle classes among CSH customers points at clear signs for financial development and the overcoming of financing restrictions, the low frequency of CSH customers in Prussia poses questions about institutional and cultural factors. There could be inherent differences between the industrialized part of Germany mainly in the West, and the Prussian agrarian East. The agrarian society of “old” Prussia, combined with an authoritarian civil servant state, might be less supportive to financial development than the industrial and more liberal states and regions in the West and South of Weimar Germany.

In summary, the three research projects presented in this thesis show the importance of financial development on macroeconomic variables and the economic development of nations. The data sets of the underlying empirical investigations reach from relatively rich and developed member states of the European Union, over a global perspective including economic leaders and powerhouses as well as less developed countries that have to catch up, to a completely historic sample of customers for CSH as a form of financial development in 1920s Germany right in the aftermath of World War I. Thus, financial development is not just a phenomenon for developing countries but affects economies in all stages of their development through altering the availability of financial services and the credit allocation. The results also show the high importance of financial development, integration, and liberalization for policy decisions.

In the first paper, we stress the benefits member states of the EU might experience from financial integration. Nevertheless, the literature also hints at financial development potentially going too far (Capelle-Blancard & Labonne 2016, Beck et al. 2013). Especially Central and Eastern Europe (Blažek & Hejnova 2020, Gal & Schmidt 2017) might experience a form of bubble with capital flowing into the region during good times that improves economic growth and reduces inequality in the respective countries. However, if these regions rely to heavily on foreign investments and creditors without developing an own independent and stable financial system with the complete offer of financial services, troubles might arise when the economic tides change and capital starts to flow out of the countries.

Studies such as by Aghion et al. (2005) point at the fact that financial integration could only be beneficial up to a certain point. They set up a theoretical model and predict that countries with more than some threshold of financial development converge

to the growth rate of the world technology frontier. All other countries will have a strictly lower long-run growth rate. Arcand et al. (2015) present similar evidence that financial development could take the form of an inverted U-shape, i.e., smaller economies profiting from finance while more developed ones do not. Especially the results of my first paper with regard to increases in the lower parts of the income distribution of EU member states and losses for top incomes points at similar effects. Paper two complements these findings as more financial access boosts economic development in the short and medium run but not in the long-term perspective. Economies could be restricted by financial literacy or other institutional factors in how they utilize financial development in the long run.

Thus, further research should look into the course of financial development and the associated capital flows to guide further political actions. Brexit as a perfect example of multilateral disintegration is now complete but Europe has not yet seen the full scale of its consequences, especially with regard to financial markets. If Europe's financial centers turn their backs on London, the UK might experience a reduction in financial development with new opportunities of research into financial disintegration (e.g., see Sampson (2017)) but also huge challenges for policy makers.

Meanwhile, the integration of European financial markets saw the reduction of financial barriers but also a severe increase in regulation and in some parts of the EU a concentration of financial markets. Especially the small and decentralized banks in Germany suffer from a huge regulatory burden and were forced to merge over the recent years (Flögel & Gärtner 2018). However, as the literature on relationship lending and soft information above shows, decentralized banking systems can greatly improve the credit allocation. Schmidt (2021) shows that the decentralized and regional banking system of Germany is perfectly suited to the German economy as a whole with its many small but specialized and economically powerful companies (Berlemann & Jahn 2016, Berlemann et al. 2020). Hence, EU regulators and political decision makers should be careful that financial integration and regulation does not go too far. Financial integration is important for economic development, but it should not threaten the uniquely different and diverse banking systems of Europe.

The results of the second paper also have implications for the advance of cashless and digital payments. The Covid-19-crisis and social distancing measures spurred another leap in the development and adaptation of digital payments. Although my analysis focused on an older technology with ATMs, the findings should still hold and show the importance of financial development on the microeconomic level for households. Policy decisions should, therefore, aim at an increase in the availability and access to financial services, be it through bank branches and ATMs or through digital payment services. Similarly to the argumentation above, too much financial integration without adequate institutions and the necessary financial literacy by customers could have negative effects in the long run but the benefits of finance for economic development in the short-term are without doubt.

The question for policy makers is then what can be done to help less developed nations and the lower end of the income distribution to save the short run gains of financial development into the long run and how to fully benefit from the potential of financial development and liberalization.

The third paper gives the greatest scope for further research and the underlying data set is a starting point for the further discussion and research into the potential causalities between institutions, culture, and financial development. Building on the works by Acemoglu et al. (2002), La Porta et al. (1997, 1998), or Shleifer & Vishny (1993, 1997) this unique data set promises great insights into the relationship between political institutions and the adaption of financial development. Weimar Germany presents two regions with uniquely different institutional settings: the more liberal and industrialized South and West and the agrarian East under the authoritarianism of Prussia. The discussion of political institutions can then be complemented with socioeconomic variables such as the predominant religion in a region (as in, e.g., Hanushek & Woessmann (2012) or Becker et al. (2016)) or potential financial literacy through the presence of stock exchanges and financial centers (e.g., see Burhop & Lehmann-Hasemeyer (2016) or Burhop & Lehmann-Hasemeyer (2014)).

In this context of institutions and financial development, another important avenue for further research could be the different voting behavior of regions in Weimar Germany. When looking at regions with a high voting share for the NSDAP in the several elections during the period of the Weimar Republic²⁷ they are almost the exact opposite to the regions with high frequency of CSH customers. Thus, the voting pattern in 1920s and 30s Germany could be used as a proxy for the institutional setting within regions. More votes for parties on the political fringe (NSDAP or KPD) indicate authoritarian institutions and a greater reliance on a strong state, while votes for the center parties (SPD or *Zentrum*) indicate a more liberal and self-reliant mindset of people.

Thus, this will be the first of two further research projects that will build on my dissertation thesis and which I will work on in the future. The rich data set of CSH customers that we collected will be used in a more empirical research framework and will be combined with the voting behavior in Weimar Germany. We will include further socioeconomic variables to better capture the characteristics of different societies in regions in 1920s and 30s Germany to draw causal conclusions between political and social institutions and the adaption of financial developments. The data and research question was already the topic of a master thesis at our Chair which delivered promising first results.

Another ongoing research project that is not part of this thesis than deals with the very regional effects of financial development and the case when financial services are not readily available. Together with Hans-Peter Burghof and my colleague Daniel Schmidt²⁸

²⁷For specific voting results see Falter et al. (1986) or for a graphical depiction Hawes (2017).

²⁸Both are also from the University of Hohenheim.

we look at the differences between Italian regions.²⁹ Italy exhibits a very divided economy with an economic powerhouse in its northern regions and the economically less-developed Mezzogiorno regions of the South. At the same time, the North of Italy is also characterized by a historically decentralized financial system with small and local banks that fit to the SMEs of the region's industrial sector. As we argued above, this decentralized financial system could be crucial for differences in the development between northern and southern regions. We show with correlated random effects-regressions for the 21 Italian NUTS2-regions³⁰ that this decentralized banking system helps northern Italy in buffering economic shocks from financial crises. Additionally, the number of banks relative to the population, the size of banks, and their focus on traditional interest rate business increase economic wealth and household incomes while reducing unemployment. We also find evidence that the economically strong North did not enter a race to the bottom to its southern neighbors during and after the sovereign debt crisis and benefits from its more diverse banking system. However, the southern regions could also not catch up. This perfectly complements the discussion on different degrees of financial integration and how finance can alter the development path of whole countries and even regional economies. The paper is currently in a revise and resubmit process at *Regional Studies* and we will improve the econometric analysis with further data on Italian firms and concentration measures of the regional banking sectors.

²⁹See Burghof et al. (2021)

³⁰The NUTS-regions, or *Nomenclature des unités territoriales statistiques*, gives a hierarchical system for the clear identification and classification of geographical units in EU member states. They are divided into NUTS 1, 2, and 3, where NUTS2-regions are comparable to the German "Regierungsbezirke".

References

- Acemoglu, D. (2009), *Introduction to Modern Economic Growth*, Princeton University Press, Princeton.
- Acemoglu, D., Johnson, S. & Robinson, J. A. (2002), ‘Reversal of fortune: Geography and institutions in the making of the modern world income distribution’, *The Quarterly Journal of Economics* **117**(4), 1231–1294.
- Acemoglu, D. & Zilibotti, F. (1997), ‘Was Prometheus unbound by chance? Risk, diversification, and growth’, *Journal of Political Economy* **105**(4), 709–751.
- Agarwal, S. & Hauswald, R. B. H. (2008), ‘The choice between arm’s-length and relationship debt: Evidence from e-loans’, *FRB of Chicago Working Paper* .
- Aghion, P., Caroli, E. & Garcia-Penalosa, C. (1999), ‘Inequality and Economic Growth: The Perspective of the New Growth Theories’, *Journal of Economic Literature* **37**(4), 1615–1660.
- Aghion, P., Howitt, P. & Mayer-Foulkes, D. (2005), ‘The effect of financial development on convergence: Theory and evidence’, *The Quarterly Journal of Economics* **120**(1), 173–222.
- Alessandrini, P., Presbitero, A. F. & Zazzaro, A. (2009), ‘Banks, distances and firms’ financing constraints’, *Review of Finance* **13**(2), 261–307.
- Amel, D. (1993), ‘State Laws Affecting the Geographic Expansion of Commercial Banks: Board of Governors of the Federal Reserve System’, *Manuscript, Board of Governors of the Federal Reserve System* .
- An, X., Deng, Y. & Sanders, A. B. (2008), ‘Subordination levels in structured financing’, *Corporate Finance* **3**, 41–60.
- Ang, J. B. (2010), ‘Finance and Inequality: The Case of India’, *Southern Economic Journal* **76**(3), 738–761.
- Angrist, J. D. & Pischke, J.-S. (2009), *Mostly Harmless Econometrics: An Empiricist’s Guide*, Princeton University Press.
- Arcand, J. L., Berkes, E. & Panizza, U. (2015), ‘Too much finance?’, *Journal of Economic Growth* **20**(2), 105–148.
- Arellano, M. & Bond, S. (1991), ‘Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations’, *The Review of Economic Studies* **58**(2), 277–297.

- Arrondel, L., Pardo, H. C. & Oliver, X. (2010), ‘Temperance in stock market participation: Evidence from France’, *Economica* **77**(306), 314–333.
- Balmer, J. M. T. & Wilkinson, A. (1991), ‘Building societies: change, strategy and corporate identity’, *Journal of General Management* **17**(2), 20–33.
- Baltzer, M., Cappiello, L., de Santis, R. A. & Manganelli, S. (2008), ‘Measuring Financial Integration in New EU Member States’, *European Central Bank, Occasional Paper Series No. 81*.
- Banerjee, A. V. & Duflo, E. (2014), ‘Do firms want to borrow more? Testing credit constraints using a directed lending program’, *Review of Economic Studies* **81**(2), 572–607.
- Banerjee, A. V. & Newman, A. F. (1993), ‘Occupational choice and the process of development’, *Journal of Political Economy* **101**(2), 274–298.
- Barro, R. J. (1996), ‘Determinants of Economic Growth: A cross-Country Empirical Study’, *NBER Working Paper*.
- Barro, R. J. (2000), ‘Inequality and Growth in a Panel of Countries’, *Journal of Economic Growth* **5**(1), 5–32.
- Baum, C. F., Schaffer, M. E. & Stillman, S. (2003), ‘Instrumental variables and GMM: Estimation and testing’, *The Stata Journal* **3**(1), 1–31.
- Beccalli, E. & Rossi, L. (2020), ‘Economies or diseconomies of scope in the EU banking industry?’, *European Financial Management* **26**, 1261–1293.
- Beck, R., Georgiadis, G. & Straub, R. (2014), ‘The finance and growth nexus revisited’, *Economics Letters* **124**(3), 382–385.
- Beck, T., Demirgüç-Kunt, A. & Levine, R. (2007), ‘Finance, inequality and the poor’, *Journal of Economic Growth* **12**(1), 27–49.
- Beck, T., Demirgüç-Kunt, A. & Singer, D. (2013), ‘Is small beautiful? Financial structure, size and access to finance’, *World Development* **52**, 19–33.
- Beck, T., Levine, R. & Levkov, A. (2010), ‘Big Bad Banks? The Winners and Losers from Bank Deregulation in the United States’, *The Journal of Finance* **65**(5), 1637–1667.
- Becker, S. O., Boeckh, K., Hainz, C. & Woessmann, L. (2016), ‘The empire is dead, long live the empire! Long-run persistence of trust and corruption in the bureaucracy’, *The Economic Journal* **126**(590), 40–74.

- Behr, P., Norden, L. & Noth, F. (2013), ‘Financial constraints of private firms and bank lending behavior’, *Journal of Banking & Finance* **37**(9), 3472–3485.
- Benfratello, L., Schiantarelli, F. & Sembenelli, A. (2008), ‘Banks and innovation: Microeconomic evidence on Italian firms’, *Journal of Financial Economics* **90**(2), 197–217.
- Berger, A. N., Miller, N. H., Petersen, M. A., Rajan, R. G. & Stein, J. C. (2005), ‘Does function follow organizational form? Evidence from the lending practices of large and small banks’, *Journal of Financial Economics* **76**(2), 237–269.
- Berleemann, M. & Jahn, V. (2016), ‘Regional importance of Mittelstand firms and innovation performance’, *Regional Studies* **50**(11), 1819–1833.
- Berleemann, M., Jahn, V. & Lehmann, R. (2020), ‘Is the German Mittelstand more resistant to crises? Empirical evidence from the Great Recession’, *CESifo Working Paper* .
- Berndt, H., Degner, J., Hamm, H. & Zehnder, A. J. (1994), *Die Bausparkassen - Bausparfinanzierung und Bausparförderung*, Fritz Knapp Verlag, Frankfurt am Main.
- Bertrand, M., Duflo, E. & Mullainathan, S. (2004), ‘How Much Should We Trust Differences-In-Differences Estimates?’, *The Quarterly Journal of Economics* **119**(1), 249–275.
- Bertrand, M. & Mullainathan, S. (2003), ‘Enjoying the Quiet Life? Corporate Governance and Managerial Preferences’, *Journal of Political Economy* **111**(5), 1043–1075.
- Blažek, J. & Hejnova, T. (2020), ‘Geography, ownership and uneven trends in the economic performance of small banking centres in Europe during the financial crisis’, *European Urban and Regional Studies* **27**(4), 359–378.
- Bodenhorn, H. (2003), *State Banking in Early America: A New Economic History*, Oxford University Press, New York.
- Bodie, Z. & Merton, R. C. (1998), ‘A Conceptual Framework for Analyzing the Financial Development’, *SSRN Working Paper* .
- Boot, A. W. A., Greenbaum, S. I. & Thakor, A. V. (1993), ‘Reputation and discretion in financial contracting’, *The American Economic Review* **83**(5), 1165–1183.
- Boot, A. W. A. & Thakor, A. V. (2000), ‘Can relationship banking survive competition?’, *The Journal of Finance* **55**(2), 679–713.
- Börsch-Supan, A. & Stahl, K. (1991), ‘Do savings programs dedicated to home-ownership increase personal savings?: An analysis of the West German Bausparkassen system’, *Journal of Public Economics* **44**(3), 265–297.

- Boyd, J. H. & Prescott, E. C. (1986), ‘Financial intermediary-coalitions’, *Journal of Economic Theory* **38**(2), 211–232.
- Boyd, J. H. & Smith, B. D. (1992), ‘Intermediation and the equilibrium allocation of investment capital: Implications for economic development’, *Journal of Monetary Economics* **30**(3), 409–432.
- Braun, R. & Henkes, J. (2019), ‘Bausparen, Bauen und Wohnen in Baden-Württemberg’, *Eine Studie der EMPIRICA AG im Auftrag der Arbeitsgemeinschaft Baden-Württembergischer Bausparkassen* .
- Burgess, R. & Pande, R. (2005), ‘Do rural banks matter? Evidence from the Indian social banking experiment’, *American Economic Review* **95**(3), 780–795.
- Burghof, H.-P. (2000), ‘Credit and information in universal banking’, *Schmalenbach Business Review* **52**(3), 282–309.
- Burghof, H.-P. & Gehrung, M. (2019), ‘Bausparen und die Kosten der privaten Immobilienfinanzierung’, *Immobilien & Finanzierung* pp. 28–30.
- Burghof, H.-P. & Gehrung, M. (2021), ‘One Market to Rule Them All - How Financial Integration Influenced Inequality in the European Union’, *CESifo Economic Studies (forthcoming)* .
- Burghof, H.-P., Gehrung, M. & Schmidt, D. (2021), ‘Under Italy’s Sun or in an Economic Shadow - The Effects of Regional Banking Systems on Economic Development in the Italian Mezzogiorno Regions’, *SSRN Working Paper* .
- Burghof, H.-P., Gehrung, M. & Schmidt, D. A. (2020), ‘Banking Systems and Their Effects on Regional Inequality and Wealth’, *SSRN Working Paper* .
- Burghof, H.-P., Schmidt, D. & Willershausen, G. (2017), ‘Bausparen und Zinsbindung - eine ökonomische Wertung’, *WM- Zeitschrift für Wirtschafts- und Bankrecht* **IV**, 1437–1442.
- Burghof, H.-P., Schmidt, D. & Willershausen, G. (2018), *Bausparen in der Krise: Verantwortung der Politik und des Rechtsstaats, in Bausparen heute – Herausforderungen und Perspektiven, Managementreihe des zeb*, Fritz Knapp Verlag: Frankfurt.
- Burhop, C. & Lehmann-Hasemeyer, S. (2016), ‘The Berlin stock exchange and the geography of German stock markets in 1913’, *European Review of Economic History* **20**(4), 429–451.
- Burhop, C. & Lehmann-Hasemeyer, S. H. (2014), ‘The geography of stock exchanges in Imperial Germany’, *FZID Discussion Paper* .

- Calem, P. (1994), ‘The Impact of Geographic Deregulation on Small Banks’, *Business Review: Federal Reserve Bank of Philadelphia* pp. 17–31.
- Capelle-Blancard, G. & Labonne, C. (2016), ‘More bankers, more growth? Evidence from OECD countries’, *Economiv Notes* **45**(1), 37–51.
- Casu, B. & Girardone, C. (2006), ‘Bank Competition, Concentration and Efficiency in the Single European Market’, *Essey Finance Centre Discussion Paper No. 05/02* .
- Chiaramonte, L., Poli, F. & Oriani, M. E. (2015), ‘Are cooperative banks a lever for promoting bank stability? Evidence from the recent financial crisis in OECD countries’, *European Financial Management* **21**(3), 491–523.
- Cieleback, M. (2002), *Optionsaspekte der Zinssicherung durch Bauspardarlehen und ihre Implikationen für die Wohneigentumsfinanzierung*, Schriften zur Immobilienfinanzierung, Köln.
- Cingano, F. (2014), ‘Trends in income inequality and its impact on economic growth’, *OECD Social, Employment, and Migration Working Paper* .
- Cinnirella, F. & Streb, J. (2017), ‘The role of human capital and innovation in economic development: evidence from post-Malthusian Prussia’, *Journal of Economic Growth* **22**(2), 193–227.
- Claessens, S. & Perotti, E. (2007), ‘Finance and inequality: Channels and evidence’, *Journal of Comparative Economics* **35**(4), 748–773.
- Claessens, S. & van Horen, N. (2014), ‘Foreign Banks: Trends and Impact’, *Journal of Money, Credit and Banking* **46**(s1), 295–326.
- Clark, C. (2007), *Iron Kingdom - The Rise and Downfall of Prussia 1600-1947*, Penguin Books.
- Clarke, G. R. G., Xu, L. C. & Zou, H.-F. (2006), ‘Finance and income inequality: what do the data tell us?’, *Southern Economic Journal* **72**(3), 578–596.
- Clingan, C. E. (2000), ‘More Construction, More Crisis: The Housing Problem of Weimar Germany’, *Journal of Urban History* **26**(5), 630–644.
- Cohn, A., Fehr, E. & Maréchal, M. A. (2014), ‘Business culture and dishonesty in the banking industry’, *Nature* **516**(7529), 86–89.
- Cole, R. A., Goldberg, L. G. & White, L. J. (2004), ‘Cookie cutter vs. character: The micro structure of small business lending by large and small banks’, *Journal of Financial and Quantitative Analysis* **39**(2), 227–251.

- Cotugno, M., Monferrà, S. & Sampagnaro, G. (2013), ‘Relationship lending, hierarchical distance and credit tightening: Evidence from the financial crisis’, *Journal of Banking & Finance* **37**(5), 1372–1385.
- de Groen, W. P., Kilhoffer, Z. & Musmeci, R. (2018), ‘The Future of EU ATM Markets - Impacts of digitalisation and pricing policies on business models’, *Centre for European Policy Studies Report* .
- Deininger, K. & Squire, L. (1996), ‘A New Data Set Measuring Income Inequality’, *The World Bank Economic Review* **10**(3), 565–591.
- Demirgüç-Kunt, A., Feyen, E. & Levine, R. (2012), ‘Benchmarking Financial Systems Around the World’, *World Bank Policy Research Working Paper 6175* .
- Demirgüç-Kunt, A. & Levine, R. (2009), ‘Finance and inequality: Theory and evidence’, *Annual Review of Financial Economics* **1**, 287–318.
- Demyanyk, Y., Ostergaard, C. & Sorensen, B. E. (2007), ‘U.S. Banking Deregulation, Small Businesses, and Interstate Insurance of Personal Income’, *The Journal of Finance* **62**(6), 2763–2801.
- Dennison, T. K. & Ogilvie, S. (2016), ‘Institutions, demography, and economic growth’, *The Journal of Economic History* **76**(1), 205–217.
- Diamond, D. W. (1984), ‘Financial intermediation and delegated monitoring’, *The Review of Economic Studies* **51**(3), 393–414.
- Diamond, D. W. (1996), ‘Financial intermediation as delegated monitoring: A simple example’, *FRTB Richmond Economic Quarterly* **82**(3), 51–66.
- Diamond, D. W. & Dybvig, P. H. (1983), ‘Bank runs, deposit insurance, and liquidity’, *Journal of Political Economy* **91**(3), 401–419.
- Djankov, S., McLiesh, C. & Shleifer, A. (2007), ‘Private credit in 129 countries’, *Journal of Financial Economics* **84**(2), 299–329.
- Dreher, A. & Gaston, N. (2008), ‘Has globalization increased inequality?’, *Review of International Economics* **16**(3), 516–536.
- Driscoll, J. C. & Kraay, A. C. (1998), ‘Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data’, *Review of Economics and Statistics* **80**(4), 549–560.
- Elsas, R. (2005), ‘Empirical Determinants of Relationship Lending’, *Journal of Financial Intermediation* **14**(1), 32–57.

- Elsas, R. & Krahn, J. P. (1998), 'Is relationship lending special? Evidence from credit-file data in Germany', *Journal of Banking & Finance* **22**(10-11), 1283–1316.
- European Commission (18.12.1992), 'Completion of the Single Market in Banking and Other Financial Services'.
- Falter, J. W., Lindenberger, T. & Schumann, S. (1986), *Wahlen und Abstimmungen in der Weimarer Republik - Materialien zum Wahlverhalten 1919-1933*, Verlag C.H. Beck, München.
- Ferri, G., Kalmi, P. & Kerola, E. (2014), 'Does bank ownership affect lending behavior? Evidence from the Euro area', *Journal of Banking & Finance* **48**, 194–209.
- Fischer, K.-H. & Pfeil, C. (2003), 'Regulation and competition in German banking: An assessment', *CFS Working Paper* .
- Flögel, F. & Gärtner, S. (2018), 'The Banking Systems of Germany, the UK and Spain from a Spatial Perspective: The German Case', *IAT Discussion Paper 18/04* .
- Frame, W. S., Fuster, A., Tracy, J. & Vickery, J. (2015), 'The rescue of fannie mae and freddie mac', *Journal of Economic Perspectives* **29**(2), 25–52.
- Frees, E. W. (1995), 'Assessing cross-sectional correlation in panel data', *Journal of Econometrics* **69**(2), 393–414.
- Furceri, D., Lougani, P., Ostry, J. D. & Pizzuto, P. (2020), 'COVID-19 will raise inequality if past pandemics are a guide', *VoxEU.org* .
URL: <https://voxeu.org/article/covid-19-will-raise-inequality-if-past-pandemics-are-guide>
- Gal, Z. & Schmidt, A. (2017), 'Europe divided? Can Warsaw become the regional leader of the Central and Eastern European region?', *Politeja* **14**(6 (51)), 235–260.
- Galor, O. & Moav, O. (2004), 'From Physical to Human Capital Accumulation: Inequality and the Process of Development', *The Review of Economic Studies* **71**(4), 1001–1026.
- Galor, O. & Tsiddon, D. (1997), 'Technological progress, mobility, and economic growth', *The American Economic Review* pp. 363–382.
- Galor, O. & Zeira, J. (1993), 'Income Distribution and Macroeconomics', *The Review of Economic Studies* **60**(1), 35.
- Gehlen, B. (2015), 'Bausparkassen - eine (typisch) deutsche Finanzinnovation?', *Bankhistorisches Archiv* **41**(1-2), 116–128.

- Gianetti, M. & Onega, S. (2005), ‘Financial Integration and Entrepreneurial Activity: Evidence from Foreign Bank Entry in Emerging Markets’, *ECB Working Paper No. 498*.
- Goldsmith, R. W. (1969), *Financial structure and development*, Yale University Press, New Haven, CT.
- Gormley, T. A. (2010), ‘The impact of foreign bank entry in emerging markets: Evidence from India’, *Journal of Financial Intermediation* **19**(1), 26–51.
- Gormley, T. A. & Matsa, D. A. (2011), ‘Growing Out of Trouble? Corporate Responses to Liability Risk’, *The Review of Financial Studies* **24**(8), 2781–2821.
- Greenwood, J. & Jovanovic, B. (1990), ‘Financial Development, Growth, and the Distribution of Income’, *Journal of Political Economy* **98**(5, Part 1), 1076–1107.
- Greenwood, J. & Seshadri, A. (2005), Technological progress and economic transformation, in ‘Handbook of Economic Growth’, Vol. 1, Elsevier, pp. 1225–1273.
- Hakenes, H., Hasan, I., Molyneux, P. & Xie, R. (2015), ‘Small banks and local economic development’, *Review of Finance* **19**(2), 653–683.
- Hakenes, H. & Schnabel, I. (2010), ‘The threat of capital drain: a rationale for regional public banks?’, *Journal of Institutional and Theoretical Economics* pp. 662–689.
- Hammond, B. (1957), *Bank and Politics in America: From the Revolution to the Civil War*, Princeton University Press, Princeton, NJ.
- Hansen, L. P. (1982), ‘Large sample properties of generalized method of moments estimators’, *Econometrica: Journal of the Econometric Society* pp. 1029–1054.
- Hanushek, E. A. & Woessmann, L. (2012), ‘Do better schools lead to more growth? Cognitive skills, economic outcomes, and causation’, *Journal of Economic Growth* **17**(4), 267–321.
- Harrison, P., Sussman, O. & Zeira, J. (1999), ‘Finance and growth: Theory and new evidence’, *SSRN Working Paper*.
- Hart, O. & Moore, J. (1999), ‘Foundations of incomplete contracts’, *The Review of Economic Studies* **66**(1), 115–138.
- Hausman, J. A. (1978), ‘Specification Tests in Econometrics’, *Econometrica* **46**(6), 1251.
- Hawes, J. (2017), *The Shortest History of Germany*, Old Street Publishing, Devon, UK.

- Hellwig, M. F. (2009), ‘Systemic risk in the financial sector: An analysis of the subprime-mortgage financial crisis’, *De Economist* **157**(2), 129–207.
- Herzer, D. & Vollmer, S. (2012), ‘Inequality and growth: evidence from panel cointegration’, *The Journal of Economic Inequality* **10**(4), 489–503.
- Hohls, R. & Kaelble, H. (2001), ‘Die regionale Erwerbsstruktur im Deutschen Reich und in der Bundesrepublik Deutschland 1895 – 1970’, GESIS Datenarchiv, Köln. ZA8212 Datenfile Version 1.0.0, <https://doi.org/10.4232/1.8212>.
- Holmström, B. & Tirole, J. (1993), ‘Market liquidity and performance monitoring’, *Journal of Political Economy* **101**(4), 678–709.
- Holtfrerich, C.-L. (1986), *The German Inflation 1914-1923: Causes and Effects in International Perspective*, De Gruyter.
- Honohan, P. (2008), ‘Cross-country variation in household access to financial services’, *Journal of Banking & Finance* **32**(11), 2493–2500.
- Jaffee, D. (2003), ‘The interest rate risk of Fannie Mae and Freddie Mac’, *Journal of Financial Services Research* **24**(1), 5–29.
- Jayaratne, J. & Strahan, P. E. (1996), ‘The Finance-Growth Nexus: Evidence from Bank Branch Deregulation’, *The Quarterly Journal of Economics* **111**(3), 639–670.
- Jensen, M. C. & Murphy, K. J. (1990), ‘Performance pay and top-management incentives’, *Journal of Political Economy* **98**(2), 225–264.
- King, R. G. & Levine, R. (1993), ‘Finance and Growth: Schumpeter Might Be Right’, *The Quarterly Journal of Economics* **108**(3), 717–737.
- Kirsch, S. & Burghof, H.-P. (2018), ‘The efficiency of savings-linked relationship lending for housing finance’, *Journal of Housing Economics* **42**, 55–68.
- Koch, P. (1986), *Versicherungsplätze in Deutschland: Baden-Württemberg*, Gabler Verlag.
- Kroszner, R. S. & Strahan, P. E. (1999), ‘What Drives Deregulation? Economics and Politics of the Relaxation of Bank Branching Restrictions’, *The Quarterly Journal of Economics* **114**(4), 1437–1467.
- La Porta, R., Lopez-de Silanes, F., Shleifer, A. & Vishny, R. W. (1997), ‘Legal determinants of external finance’, *The Journal of Finance* **52**(3), 1131–1150.
- La Porta, R., Lopez-de Silanes, F., Shleifer, A. & Vishny, R. W. (1998), ‘Law and finance’, *Journal of Political Economy* **106**(6), 1113–1155.

- Langer, E. (1965), *Wüstenrot: Eine Idee setzt sich durch; zum 100. Geburtstag von Georg Kropp, dem Begründer des Bausparens in Deutschland*, Bausparkasse Gemeinschaft d. Freunde Wüstenrot, Ludwigsburg.
- Law, S. H. & Singh, N. (2014), ‘Does too much finance harm economic growth?’, *Journal of Banking & Finance* **41**, 36–44.
- Lehmann-Hasemeyer, S. & Streb, J. (2018), ‘Does Social Security Crowd Out Private Savings? The Case of Bismarck’s System of Social Insurance’, *European Review of Economic History* **22**(3), 298–321.
- Lehmann-Hasemeyer, S. & Wahl, F. (2017), ‘Savings Banks and the Industrial Revolution in Prussia - Supporting Regional Development with Public Financial Institutions’, *CEPR Discussion Paper Series* .
- Levine, R. (2005), ‘Finance and growth: theory and evidence’, *Handbook of Economic Growth* **1**, 865–934.
- Lucas, R. (1988), ‘On the mechanics of economic development’, *Journal of Monetary Economics* **22**(1), 3–42.
- Lucas, R. E. (1990), ‘Why doesn’t capital flow from rich to poor countries?’, *The American Economic Review* **80**(2), 92–96.
- Marer, P. (2010), ‘The global economic crises: Impacts on Eastern Europe’, *Acta Oeconomica* **60**(1), 3–33.
- Maskin, E. & Tirole, J. (1999), ‘Unforeseen contingencies and incomplete contracts’, *The Review of Economic Studies* **66**(1), 83–114.
- Maurer, K.-O. (2019), ‘Honesty in Regional Cooperative Banks’, *Credit and Capital Markets* **52**(3), 423–444.
- McKenzie, D. J. & Woodruff, C. (2006), ‘Do entry costs provide an empirical basis for poverty traps? Evidence from Mexican microenterprises’, *Economic Development and Cultural Change* **55**(1), 3–42.
- McKinnon, R. I. (1973), *Money and Capital in Economic Development*, The Brookings Institute, Washington DC.
- McLaughlin, S. (1995), ‘The Impact of Interstate Banking and Branching Reform: Evidence from the States’, *Federal Reserve Bank of New York, Current Issues in Economics and Finance* .

- Milanovic, B. (2016), *Global inequality: A new approach for the age of globalization*, Harvard University Press, Cambridge, Massachusetts.
- Miller, M. H. (1998), 'Financial markets and economic growth', *Journal of Applied Corporate Finance* **11**(3), 8–15.
- Molterer, M. (2019), 'Tougher than the rest? The resilience of specialized financial intermediation to macroeconomic shocks', *The Quarterly Review of Economics and Finance* **74**, 163–174.
- Molterer, M., Amon, J. & Tyrell, M. (2017), 'Specialized Financial Intermediaries and the Impact of Savings and Loan Contracts on Real Estate Finance', *SSRN Working Paper*.
- Mookerjee, R. & Kalipioni, P. (2010), 'Availability of financial services and income inequality: The evidence from many countries', *Emerging Markets Review* **11**(4), 404–408.
- Morgan, D. P., Rime, B. & Strahan, P. E. (2004), 'Bank Integration and State Business Cycles', *The Quarterly Journal of Economics* **119**(4), 1555–1584.
- Müller, M. L. (1999), *Bausparen in Deutschland zwischen Inflation und Währungsreform 1924-1948*, C.H. Beck, München.
- Mundaca, B. G. (2009), 'Remittances, financial market development, and economic growth: the case of Latin America and the Caribbean', *Review of Development Economics* **13**(2), 288–303.
- Ndikumana, L. (2005), 'Financial development, financial structure, and domestic investment: International evidence', *Journal of International Money and Finance* **24**(4), 651–673.
- OECD (2011), *An Overview of Growing Income Inequalities in OECD Countries: Main Findings, Divided We Stand: Why Inequality Keeps Rising*, OECD and University Presses Marketing, Paris and Bristol.
- Ogba, E. J., Efiog, E. J. & Ogba, A. O. (2016), 'The Distribution of Automated Teller Machine (ATM) in Calabar Metropolis, Cross River State, Nigeria ', *Scholars Journal of Economics, Business and Management* **3**(7), 347–359.
- Olsen, M. (2000), *Power and Prosperity: Outgrowing Communist and Capitalist Dictatorships*, Basic Books.
- Petersen, M. A. & Rajan, R. G. (1994), 'The benefits of lending relationships: Evidence from small business data', *The Journal of Finance* **49**(1), 3–37.

- Petersen, M. A. & Rajan, R. G. (1995), ‘The effect of credit market competition on lending relationships’, *The Quarterly Journal of Economics* **110**(2), 407–443.
- Piketty, T. (2000), ‘Theories of persistent inequality and intergenerational mobility’, *Handbooks in Economics* **16**, 429–476.
- Pradhan, R. P., Arvin, M. B., Bahmani, S., Hall, J. H. & Norman, N. R. (2017), ‘Finance and growth: Evidence from the ARF countries’, *The Quarterly Review of Economics and Finance* **66**, 136–148.
- Proettel, T. (2017), ‘Path dependencies in European savings banks: the impact of the fundamental decisions from the beginning of the 19th century’, *Vierteljahrschrift für Sozial-und Wirtschaftsgeschichte* **104**(2), 177–202.
- Puente-Ajovín, M. & Sanso-Navarro, M. (2015), ‘Granger causality between debt and growth: Evidence from OECD countries’, *International Review of Economics & Finance* **35**, 66–77.
- Radner, R. (1981), ‘Monitoring cooperative agreements in a repeated principal-agent relationship’, *Econometrica* pp. 1127–1148.
- Radner, R. (1985), ‘Repeated principal-agent games with discounting’, *Econometrica* pp. 1173–1198.
- Rajan, R. G. & Zingales, L. (2003), ‘The great reversals: the politics of financial development in the twentieth century’, *Journal of Financial Economics* **69**(1), 5–50.
- Ranjbar, O. & Rassekh, F. (2017), ‘The impact of financial development on income convergence: An application of two exogenous growth models’, *International Review of Economics & Finance* **50**, 65–74.
- Rietmann, F. (2005), *Bewertung von impliziten Optionen in Bausparverträgen*, Peter Land GmbH, Internationaler Verlag der Wissenschaften, Frankfurt am Main.
- Rioja, F. & Valev, N. (2014), ‘Stock markets, banks and the sources of economic growth in low and high income countries’, *Journal of Economics and Finance* **38**(2), 302–320.
- Robinson, J. (1952), *The Rate of Interest and Other Essays*, Macmillan, London.
- Rogoff, K. S. (2017), *The curse of cash: How large-denomination bills aid crime and tax evasion and constrain monetary policy*, Princeton University Press.
- Roodman, D. (2009), ‘How to do xtabond2: An introduction to difference and system GMM in Stata’, *The Stata Journal* **9**(1), 86–136.
- Rothenbacher, F. (2002), *The European Population, 1850-1945*, Palgrave Macmillan.

- Sampson, T. (2017), ‘Brexit: the economics of international disintegration’, *Journal of Economic Perspectives* **31**(4), 163–84.
- Sargan, J. D. (1958), ‘The estimation of economic relationships using instrumental variables’, *Econometrica: Journal of the Econometric Society* pp. 393–415.
- Savage, D. T. (1993), ‘Interstate Banking: A Status Report’, *Federal Reserve Bulletin*, *LXXIX* pp. 1075–1089.
- Schmidt, D. A. (2021), ‘The Impact of Regional Banking Systems on Firms and SMEs – Evidence from five European Countries’, *SSRN Working Paper* .
- Scholten, U. (1999), *Die Förderung von Wohneigentum*, Mohr Siebeck, Tübingen.
- Schumpeter, J. A. (1969), *The Theory of Economic Development*, Oxford University Press.
- Schüren, R. (1989), *Soziale Mobilität: Muster, Veränderungen und Bedingungen im 19. und 20. Jahrhundert*, Scripta Mercaturae Verlag, St. Katharinen.
- Schuster, S. S., Jaremski, M. & Perlman, E. R. (2019), ‘An Empirical History of the United States Postal Savings System’, *NBER Working Paper* .
- Selgert, F. (2013), ‘Civil Servants’ Living Standards in the Grand-Duchy of Baden, 1780–1913’, *Jahrbuch für Wirtschaftsgeschichte / Economic History Yearbook* **54**(1), 153–179.
- Shaffer, S. (2001), ‘Banking conduct before the European single banking license: A cross-country comparison’, *North American Journal of Economics and Finance* **12**, 79–104.
- Sharpe, S. A. (1990), ‘Asymmetric information, bank lending, and implicit contracts: A stylized model of customer relationships’, *The Journal of Finance* **45**(4), 1069–1087.
- Shleifer, A. & Vishny, R. W. (1993), ‘Corruption’, *The Quarterly Journal of Economics* **108**(3), 599–617.
- Shleifer, A. & Vishny, R. W. (1997), ‘A survey of corporate governance’, *The Journal of Finance* **52**(2), 737–783.
- Sirri, E. & Tufano, P. (1995), *The Economics of Pooling*, Harvard Business School Press.
- Spoerer, M. & Streb, J. (2014), ‘Die Weimarer Republik in der Weltwirtschaftskrise: Geschichte oder Erfahrung?’, *Perspektiven der Wirtschaftspolitik* **15**(4), 291.
- Statista (2013), Umfrage in Deutschland zum (guten) Image von Bausparkassen, Technical report, Statista Research Department.
- URL:** <https://de.statista.com/statistik/daten/studie/419396/umfrage/umfrage-in-deutschland-zum-guten-image-von-bausparkassen/>

- Stein, J. C. (2002), ‘Information production and capital allocation: Decentralized versus hierarchical firms’, *The Journal of Finance* **57**(5), 1891–1921.
- Stolper, W. F. & Samuelson, P. A. (1941), ‘Protection and real wages’, *The Review of Economic Studies* **9**(1), 58–73.
- Tan, H.-B. & Law, S.-H. (2012), ‘Nonlinear dynamics of the finance-inequality nexus in developing countries’, *The Journal of Economic Inequality* **10**(4), 551–563.
- Townsend, R. M. & Ueda, K. (2006), ‘Financial deepening, inequality, and growth: a model-based quantitative evaluation’, *The Review of Economic Studies* **73**(1), 251–293.
- Uhde, A. & Heimeshoff, U. (2009), ‘Consolidation in banking and financial stability in Europe: Empirical evidence’, *Journal of Banking & Finance* **33**(7), 1299–1311.
- van Leeuwen, M. H. D. & Maas, I. (2011), *HISCLASS: a Historical International Social Class Scheme*, Leuven University Press.
- Verardi, V. & Croux, C. (2009), ‘Robust regression in Stata’, *The Stata Journal* **9**(3), 439–453.
- Voigtländer, M. (2009), ‘Why is the German Homeownership Rate so Low?’, *Housing Studies* **24**(3), 1466–1810.
- Wallison, P. J. & Calomiris, C. W. (2009), ‘The last trillion-dollar commitment: the destruction of Fannie Mae and Freddie Mac’, *The Journal of Structured Finance* **15**(1), 71–80.
- White, H. (1982), ‘Regularity conditions for Cox’s test of non-nested hypotheses’, *Journal of Econometrics* **19**(2-3), 301–318.
- Williamson, O. E. (1979), ‘Transaction-cost economics: the governance of contractual relations’, *The Journal of Law and Economics* **22**(2), 233–261.
- Wooldridge, J. M. (2010), *Econometric analysis of cross section and panel data*, MIT Press, Cambridge, Massachusetts.
- Zietemann, U. (1987), *Die Finanzierung von selbstgenutztem Wohneigentum. Eine computergestützte Systemanalyse*, VVW, Karlsruhe.