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Working Paper

Does Social Security crowd out Private Savings? The Case of Bismarck's System of Social Insurance

IBF Paper Series, No. 06-17

Provided in Cooperation with:
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Suggested Citation: Lehmann-Hasemeyer, Sibylle; Streb, Jochen (2017) : Does Social Security crowd out Private Savings? The Case of Bismarck's System of Social Insurance, IBF Paper Series, No. 06-17, IBF - Institut für Bank- und Finanzgeschichte, Frankfurt a. M.

This Version is available at:
https://hdl.handle.net/10419/162212

IBF Paper Series 06-17

Does Social Security crowd out Private Savings? The Case of Bismarck's System of Social Insurance

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Abstract: Imperial chancellor Bismarck's system of social insurance (with its three pillars health, accident and pension insurance) was an important role model for social security systems across Europe and in the US. How the introduction of the German system changed economic expectations and decisions of the German workforce has not been researched, though. This article closes this gap by analyzing the development of Prussian savings banks' deposits in the late 19th century with the help of a difference-in-difference-like approach. We show that, in the Prussian case, social security crowded out private savings considerably. As counterfactual voluntary savings would have been far from sufficient, however, Bismarck's social insurance system was still needed to fight the misery workers and their families potentially faced in old age or times of sickness.

JEL Classification: D14, E 21, H55, N33

IBF – Institut für Bank- und Finanzgeschichte e.V.
Eschersheimer Landstraße 121-123
D-60322 Frankfurt am Main
Germany
www.ibf-frankfurt.de

IBF

IBF Paper Series
Banking and Finance in Historical Perspective
ISSN 2510-537X

Redaktion / Editorial Office

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Does Social Security crowd out Private Savings?
The Case of Bismarck's System of Social Insurance[1]

Contents

[1] The paper is a revised version (March 17, 2017) of the working paper Lehmann-Hasemeyer / Streb (2016b). This project was funded by the German Science Foundation (DFG), as part of the Priority Programme 1859 ‹Experience and Expectation. Historical Foundations of Economic Behaviour›. We wish to thank our student assistants who helped to collect the data. Furthermore, we are very grateful for the comments of Alexander Donges, Timothy W. Guinnane, Tobias Jopp, Katerina Piro, Thorsten Proettel, and the participants in research seminars at Hohenheim/Stuttgart, the Humboldt University in Berlin, the Max Planck Institute for Research on Collective Goods at Bonn, Yale and Siena, the second annual conference of the Priority Programme 1859 in Mannheim, the workshop "Health and Welfare" in Groningen and the ‹Kongress für Wirtschafts- und Sozialgeschichte› in Bonn. The usual disclaimer applies.

1. Introduction

The actual American debate about Obamacare is just the latest revival of an already old debate about whether social insurance is needed to support the working poor. In 1957, for example, the German minister for economic affairs Ludwig Erhard predicted the imminent end of the traditional German social insurance system because he was strongly convinced that steadily rising per-capita income would soon enable prudent households to increase their precautionary savings solely on the basis of their own responsibility.[2] This prediction turned out to be a blatant miscalculation. In that very same year chancellor Konrad Adenauer enforced a new German pensions act that automatically linked pension levels to economic growth thereby raising the West German welfare state to a whole new level.[3] In the following national election, for the first and only time, Adenauer's conservative party CDU won with the absolute majority of votes.

Erhard's arguments in favor of a termination of the traditional social insurance system still provide important insights into the reasons why this system had been introduced in the first place. In the early 1880s, Imperial Chancellor Otto von Bismarck and his political advisers assumed that (blue-collar) workers lacked both the economic capacity and the rational foresight to provide independently for life risks such as old age, illness or invalidity. That is why they decided to force workers to do what was good for them by establishing compulsory social insurance.[4] Interestingly enough, similar paternalistic arguments had already motivated the introduction of savings banks in the early nineteenth century. In particular, savings banks were thought to teach poor people the value of saving.[5]

If the German savings banks fulfilled their educational mission, the question arises whether (and to what extent) the establishment of Bismarck's system of compulsory social insurance actually changed workers' voluntary savings. In theory, social security can affect private savings in at least two different ways.[6] On the one hand, if households aim for a certain amount of total savings, the introduction of compulsory social insurance might induce them to reduce their voluntary precautionary savings. On the other hand, the introduction of compulsory social insurance might give

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2 Erhard (1957), p. 254.

3 See *Gesetz zur Neuregelung des Rechts der Rentenversicherung der Arbeiter vom 23. Februar 1957*, Bundesgesetzblatt I (1957), pp. 45-87; *Gesetz zur Neuregelung des Rechts der Rentenversicherung der Angestellten vom 23. Februar 1957*, Bundesgesetzblatt I (1957), pp. 88-131.

4 See *Kaiserliche Botschaft vom 17. November 1881*, Abhandlungen des Reichstags, V. Legislaturperiode, Erste Session, 1881, pp. 1-3.

5 Ashauer (1998), p. 57.

6 Feldstein (1974); Leimer / Lesnoy (1982) discovered a computation mistake in Feldstein's empirical analysis.

people a reason to reflect on their financial needs at old age or when sick, thereby increasing their motivation to build up larger private savings accounts.

Based on information about savings banks' deposits in 398 Prussian counties in the decades before the First World War we will analyze which of these effects dominated in the late nineteenth century. To establish causality, we make use of the fact that many occupations were not affected by the introduction of Bismarck's social security system and could therefore be used as a control group, such as miners and public servants who already had a functioning social security system since the middle of the nineteenth century, and self-employed persons who were not covered by any compulsory social insurance in the period under observation. We employ a difference-in-difference-like approach and show that, in Prussia, social security crowded out workers' private savings considerably. The finding that this crowding-out effect increased over time is evidence for economic learning: Prussian workers needed time to understand the economic implications of compulsory social security and therefore changed their savings behavior only gradually and with some delay. However, our quantitative analysis does not imply that the introduction of social insurance was an unnecessary policy measure. The opposite is true: as voluntary savings would have been far from sufficient, Bismarck's social insurance system was needed to fight the misery workers and their families potentially faced in old age or times of sickness.

The paper is organized as follows. Section 2 discusses the relationship between social security and private savings on the basis of the theoretical and empirical literature. Section 3 provides information about the historical development of both savings banks and social insurance in Prussia. In this section, we also elaborate the basic idea of our identification strategy. Section 4 introduces the data. Section 5 presents the empirical analysis. Section 6 concludes.

2. Related Literature

In the early 1950s Franco Modigliani and his student Richard Brumberg[7] developed the life cycle hypothesis of saving which assumes that individuals save during their working years to secure a certain consumption level after their retirement. In his seminal paper Martin Feldstein[8] raises the question whether the introduction of compulsory social insurance affects an individual's decision-

[7] Because of the untimely death of Brumberg in August 1954, their joint paper was never published. See Ando / Modigliani (1963).

[8] Feldstein (1974).

making about her private savings under the life cycle hypothesis. He assumes a strong substitution effect between these two types of old-age provision. Given that an individual's preferred consumption level at old age does not change with the introduction of social insurance, she will reduce her private savings in the amount of her expected pension claims. In contrast to this view, Philipp Cagan[9] and George Katona[10] suggest that pensions and private savings are complements rather than substitutes.

Cagan[11] stresses the role of the so-called recognition effect. In his opinion, the introduction of social insurance might give people for the first time a reason to consider their financial needs at old age (or when sick or disabled after a work-related accident), thereby increasing their motivation to build up private savings. It is the assumed life cycle myopia of workers which is generally used to justify the introduction of paternalistic social security systems of the Bismarckian type.[12] Katona[13] assumes that people with low income usually do not save because getting to a level of savings that would allow for an adequate consumption at old age seems out of reach. After the introduction of compulsory social insurance which is partly financed by employers and public subsidies, however, poor people can expect to receive pension payments that finance a great deal of their consumption at old age (or when being incapacitated for work). That is why they now have incentives to build up additional private savings in order to bridge the remaining (and comparably small) shortfall in future consumption. Agreeing with Katona's hypothesis, Johnson[14] claims that British working class people started saving for old age only after the liberal government had introduced (in 1908) a tax-financed and means-tested pension for people older than 70.

Similar to Johnson's approach scholars usually focus on major political reforms when trying to identify the impact of social insurance on private savings. The empirical evidence, however, is mixed and varies across countries, occupational groups, different time periods and political reforms. Kantor and Fishback[15], for example, address the introduction of workers' compensation in the American states in the 1910s. They estimate that this institutional change caused private savings to fall by about one quarter. Attanasio and Rohweder[16] as well as Attanasio and Brugiavini[17] exploit pension reforms in the UK in the 1970s and 1980s and in Italy in 1992, respectively. Their

9 Cagan (1965).
10 Katona (1965).
11 Cagan (1965).
12 Feldstein/Liebman (2002), p. 2269. In a poor relief system, workers are discouraged to save because they are forced to spend all their savings before they will be entitled to state support. That is another reason why private savings might increase after the introduction of social security.
13 Katona (1965).
14 Johnson (1984).
15 Kantor / Fishback (1996).
16 Attanasio / Rohweder (2003).
17 Attanasio / Brugiavini (2003).

results indicate that the extent of the substitution effect depends on the age of the affected individuals. They do not discuss, however, their inconsistent findings: In the UK, the substitution effect was largest for nearly retired individuals, whereas in Italy the younger age group reacted more sensitive to the changes in pension wealth. Cutler and Gruber[18] explore the substitution between social and private insurance. They show that the expansion of Medicaid to pregnant women and children in the late 1980s crowded out private health insurance in the US by about 50 percent of the increase in coverage.

Using data from a survey that was conducted in 2008 and covered 13 European countries Alessie, Angelini and van Santen[19] analyze the relationship between pension wealth and private savings in a cross country setting. They observe that the substitution effect strongly differs across countries and occupational groups. Especially, they find that low-educated people does not react to changes in pension wealth, whereas highly educated individuals decrease their private savings in line with the increase in their pension claims. Finally, Andersson and Eriksson[20] show that the introduction of a compulsory public pension system in Sweden in 1914 reduced the demand for life insurance significantly but had no measurable effect on private savings at banks.

Surprisingly enough, researchers have long neglected the German experience. This only changed with Beatrice Scheubel[21] who explores the substitution between social security and a very particular type of old age provision, that is having many children. Like other industrialized countries Germany experienced a pronounced period of fertility decline at the turn of the previous century when the total fertility rate fell from about 5.5 children per woman in 1885 to less than 2.5 in the 1920s. Scheubel argues that the introduction of the social security system in the 1880s played a larger role in this development than is usually assumed. Her main argument is that pension insurance fully decoupled the motive to provide for old age from the decision to have children. In economic terms, compulsory public insurance crowded out any type of investment in private insurance: Employees that became subject to social insurance contributions reduced both private savings for old age and the number of children who were traditionally supposed to support their old and disabled parents. In Scheubel's opinion, the latter substitution effect was intensified by the externalities of the pay-as-you-go system in which the children of other people have to pay for the pensions of childless people.

To test her hypotheses empirically Scheubel relies on cross-sectional observations of the demographic development in the 41 regions (*Regierungsbezirke*) of the German Empire between

[18] Cutler / Gruber (1996).
[19] Alessie / Angelini / van Santen (2013).
[20] Andersson / Eriksson (2015).
[21] Scheubel (2013).

1878 and 1914. Her identification strategy makes use of the fact that the extent to which the population was covered by the newly-introduced social pension insurance differed across German provinces and over time. She employs a difference-in-difference approach in which the treatment group consists of all provinces where the share of insured people was higher than the sample mean plus one standard deviation. Her conclusion is that up to a third of the observable decline in crude birth rates was determined by the introduction and extension of the pension system. Measuring industrialization by the share of population working in mining Scheubel[22] claims that this factor had an independent negative effect on fertility too. We think that this deduction is misleading. Tobias Jopp[23] shows that German miners had been covered by a sector-specific pension system (very similar to the Bismarckian one) already since the middle of the nineteenth century and therefore faced incentives to reduce their number of children long before the other industrial workers. That is why the share of miners and other compulsory insured people can help to identify regions with a very early treatment. In the next section, we will use this insight to develop a more refined difference-in-difference-like approach in order to analyze the impact of social security on private savings in the Prussian counties where, in 1900, about 60 percent of the total German population lived.

3. Institutional Change

Inspired by experiences with earlier financial institutions like pawnshops and orphans' funds, the first German savings banks were founded in the northern parts of the country, namely in Hamburg (1778), Oldenburg (1786), Kiel (1796), and Altona (1801).[24] In Prussia, where municipal savings banks dominated from the beginning, the first savings bank was established in Berlin in 1818.[25] By 1913, the number of savings banks had risen to 1,765 in Prussia and 3,133 in the whole German Empire.[26] Measured by their share in the total assets of all German financial institutions in the year 1913, savings banks represented with 24.8 percent the largest group of banks, closely followed by incorporated credit banks with 24.2 percent and mortgage banks with 22.8 percent.[27]

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22 Scheubel (2013), p. 158.
23 Jopp (2013).
24 Wysocki (1980), p. 24.
25 Ashauer (1998).
26 Deutsche Bundesbank (1976), pp. 63 et seq.
27 Guinnane (2002), p. 81; Burhop (2002) finds a significant positive relationship between the German savings banks' financial depth and Germany's real capital stock for the period 1883 to 1913. This result implies that the savings

The original purpose of savings banks was to provide poor people with the opportunity to build up funds that could be used in times of need. For that reason, some savings banks defined their target group very precisely. The savings bank of Trier, for example, which was located in the Prussian Province Rhineland, planned to accept as depositors only day laborers, domestic servants, soldiers up to the rank of non-commissioned officers, and public servants who earned less than 12 thalers per month.[28] However, many savings banks did not adhere to their founding principles and also accepted wealthier customers. Other savings banks explicitly opened up to all locals regardless of their income level. It is therefore not surprising that, in the nineteenth century, the lowest social strata accounted for only about 40 to 50 percent of all savings bank books, with an even lower share in savings banks' total deposits.[29]

Yet, executives of the savings banks still feared that the introduction of Bismarck's social security system with its three pillars health insurance (1883),[30] accident insurance (1884)[31] and pension insurance (1889)[32] would crowd out private savings.[33] The three pillars of the new social security system had in common that they insured all industrial blue-collar workers and those white-collar workers whose annual earnings did not exceed 2,000 marks. With respect to insurance benefits, the health insurance provided sick pay and medical treatment for up to thirteen weeks. The accident insurance law required that an injured worker received all medical care free of charge.[34] The law also included further mandatory benefits based on the worker's income at the time of the accident. A permanently disabled worker, for instance, received two thirds of his last earnings as a pension. Widows and orphans were entitled to a survivor's pension. According to the legal rules of the pension insurance, workers obtained an old-age pension after reaching the age of 70. This pension payment was not meant to cover the full cost of living but should only compensate for the drop in income that elderly workers had to accept due to their decreasing labor productivity.

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banks' role in financing Germany's small and medium-sized industry was more important than hitherto assumed; see also Proettel (2013).

28 Ashauer (1998), p. 55; see also the statues of the early savings banks in Hamburg or Oldenburg published in Wysocki (1980), pp. 198-200; the savings banks' lending business is described in Proettel (2013).

29 Wysocki (1980), pp. 76-83; for the lower social strata saving was the only way to accumulate wealth. Although the German stock market was already well developed, the minimum denominations of shares and bonds were too expensive to be affordable for workers. See Lehmann (2014) and Burhop / Lehmann (2016).

30 The health insurance came effective in December 1884. See *Gesetz betreffend der Krankenversicherung der Arbeiter vom 15. Juni 1883*, Reichsgesetzblatt (1883), pp. 73-104.

31 The accidence insurance came in force in October 1885. See *Unfallversicherungsgesetz vom 6. Juli 1884*, Reichsgesetzblatt (1884), pp. 125-133.

32 The pension insurance became effective in January 1891. See *Gesetz betreffend die Invaliditäts- und Altersversicherung vom 22. Juni 1889*, Reichsgesetzblatt (1889), pp. 97-144.

33 Ashauer (1998), p. 72.

34 Guinnane / Streb (2015) show that a more consistent use of the rules and the limited incentives available under the accident insurance law would have reduced industrial accidents earlier and more extensively.

The three pillars of social insurance differed considerably with regard to their funding. Employers had to finance all of the expenses of the accident insurance, two thirds of the costs of the health insurance, and half of the financial obligations of the pension insurance. Workers' pay checks were reduced to cover the remainder in each case. In addition, the central government subsidized the pension insurance by providing a grant of 50 marks per insured.

Ashauer claims that German savings banks' worries proved wrong. In his view, the introduction of social insurance in the 1880s could simply not crowd out private savings because most workers did not save for old age or invalidity but rather for specific consumption needs.[35] Even though Wysocki observes that workers' individual savings deposits were often high enough to cover the living expenses for a whole year,[36] he also does not believe that workers voluntarily saved for retirement or long periods of sickness. Given the impressive increase of savings banks' total deposits that grew in Germany from 2.6 billion in 1880 to 19.7 billion marks in 1913, and in Prussia from 1.6 billion to 13.1 billion marks,[37] both historians felt the need to deny any substitution effect between private savings and social security.

The eightfold increase in savings banks' total deposits in the three decades before the First World War has a lot to do with the fact that both the number of potential savers and the individual saving capacity grew considerably in this period. In the German Empire, population rose between 1880 and 1913 by about 50 percent, real wages by about 60 percent.[38] However, this growth-driven increase in savings activities might obscure that, at the same time, social security crowded out private savings.

Our identification strategy follows a similar logic as a standard difference-in-difference approach. Ideally, we would like to compare the individual savings activities of the newly-insured industrial workers with the savings activities of other people who were potential savers but not affected by Bismarck's social security system policy, either because they already had compulsory insurance or because they were not covered by the new laws. Note, however, that we do not have detailed data about individual Prussian households. That is why we cannot contrast the savings activities of households that were (voluntarily or compulsorily) insured against major life risks with those that were not insured. Based on statistical information about the geographic distribution of different occupational groups we instead focus on comparing savings activities of Prussian counties that differ with respect to their share of persons that were most likely affected by Bismarck's social policy. To do this as exactly as possible we have to consider which other occupational groups

35 Ashauer (1998), p. 72.
36 Wysocki (1980), p. 88.
37 Deutsche Bundesbank (1976), pp. 63 et seq.
38 Rothenbacher / Fertig (2015); Pierenkemper (2015).

were already compulsorily insured in our period of observation and which groups were not covered by Bismarck's new social security system. Table 1 shows when the different occupational groups have been included in health, accident, and pension insurance respectively.

Table 1: Treatment and Control Groups

GROUP	HEALTH INSURANCE	ACCIDENT INSURANCE	PENSION INSURANCE
Already treated			
Public Servants[+]	1825	1885	1825
Miners	1854	1854	1854
Untreated, i.e not yet treated			
Farmers	1973	1939	1957
Self-employed persons	1972 (voluntary entry possible)		
Only partly treated			
Farm workers	1913	1886	1891
Domestic servants	1913	No	1891
Newly treated			
Industrial workers	1884	1885	1891 (widow's benefit since 1927)
Construction workers	1884	1887	1891
White-collar workers below 2000 marks annual income	1884	1885	1891

[+]public servants covers ‹Post-, Telegraphen- und Eisenbahnbetrieb; Verwaltungs- und Arbeiterpersonal, Verwaltung und Rechtspflege; Verwaltungs- und Arbeiterpersonal and Religionspflege, Erziehung und Unterricht; Verwaltungs- und Arbeiterpersonal›.
Source: See text.

To begin with, miners had already been subject to compulsory social insurance since the middle of the nineteenth century. In 1854, the Prussian government established industry-specific social insurance carriers (so-called *Knappschaften*) that insured miners against income losses due to temporary sickness, permanent invalidity, and survivorship of a miner's spouse and children.[39] Since every miner became unfit for mining eventually and therefore entitled to a life-long invalidity pension, Jopp argues that Knappschaften implicitly also provided old-age pensions.[40] The replacement rates of the miners' social insurance system were relatively generous. The invalidity pension came to about 10 to 30 percent of miners' average income, the daily sick pay amounted to about 30 to 50 percent of miners' daily wages.[41] If miners considered social security and private savings as close substitutes, we would assume that they saved significantly less than other workers who

[39] For the history of Prussian miners' social security system, see Guinnane / Streb (2011) and Jopp (2011, 2012, 2013).
[40] Jopp (2013), p. 58.
[41] Jopp (2013), p. 141.

could not hope for sick pay or invalidity pension until the introduction of Bismarck's compulsory social security system. Beginning in the 1880s, however, when all workers were treated equally with respect to social security, we would expect private savings of miners and other industrial workers to converge. Moreover, public servants had benefited from preferential treatment already since 1825 when the Prussian government had entitled them to old age pensions and sick pay.[42] Even though Prussian public servants were not members of a compulsory social insurance system in a legal sense, they were in an economic sense because, like the Prussian miners, they were not forced to build up private savings in order to provide for life risks.

Farm workers were soon defined as compulsory members both of the accident insurance and the pension insurance.[43] However, this occupational group remained excluded from Bismarck's health insurance until 1913. Sector-specific social insurance for self-employed farmers was introduced later in the twentieth century, namely accident insurance[44] in 1939, pension insurance[45] in 1957, and health insurance[46] in 1973.[47] Domestic servants who had been one of the major target groups of the early savings banks were for a long time only included in the pension insurance. Since 1913, they were also accepted by the health insurance. As already mentioned above, white-collar workers with an annual income below 2,000 marks were treated like blue-collar workers. Only in 1913 did white-collar workers with an annual income above 2,000 marks also become compulsory members of the social insurance system.[48]

To sum up, this short review of social security legislation suggests that we should distinguish four different groups in the following quantitative analysis of savings activities in Prussian counties:

1. Persons that were already compulsory insured (‹**already treated**›). We assume that they saved significantly less than other employees who could not hope for sick pay or invalidity pension until the introduction of Bismarck's compulsory social security system. We expect precautionary savings of this group and other industrial workers to converge from the 1880s onwards.

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[42] See *Preußisches Pensionsreglement für die Civil-Staatsdiener vom 30. April 1825*, Grundgesetze über die innere Verwaltung des Preußischen (1942), pp. 317-326.

[43] See *Gesetz betreffend die Unfall- und Krankenversicherung der in land- und forstwirtschaftlichen Betrieben beschäftigten Personen vom 5. Mai 1886*, (Reichsgesetzblatt (1886), pp. 132-178.

[44] See *Fünftes Gesetz über Änderungen in der Unfallversicherung vom 17. Februar 1939*, Reichsgesetzblatt (1939), pp. 267-275.

[45] See *Gesetz über die Altershilfe für Landwirte vom 27. Juli 1957*, Bundesgesetzblatt I (1957), pp. 1063-1068.

[46] See *Gesetz über die Krankenversicherung der Landwirte vom 10. August 1972*, Bundesgesetzblatt I (1972), pp. 1433-1458.

[47] Self-employed persons outside the agricultural sector can voluntarily apply for compulsory membership in the German social insurance system since 1972. See *Rentenreformgesetz vom 16. Oktober 1972*, Bundesgesetzblatt I (1972), pp. 1965-1997.

[48] See *Versicherungsgesetz für Angestellte vom 20. Dezember 1911*, Reichsgesetzblatt (1911), pp. 989-1061

2. Persons that should not have changed their savings behavior in our period of observation because they were not covered by the new social security system (‹**untreated**›).[49] We have to consider, however, that this group might have been affected indirectly if they belonged to a working class household where the breadwinner was newly treated.[50]
3. Persons who were only partially covered by Bismarck's reform (‹**only partly treated**›) and therefore changed their savings behavior with a lower probability or to a lower extent than the group of ‹newly treated›.
4. All other employees who became compulsory members of all three pillars of Bismarck's social security system until 1891 (‹**newly treated**›).

The last group is our true treatment group that is the group of savers that was most likely affected by the introduction of Bismarck's social security system. However, some of the employees who were part of this group could have been voluntarily insured before the 1880s. They could have joined local social security funds that were founded (and financed) by some employers, municipalities, or charities. They could also have bought life insurance that was already offered by private insurance companies.[51] We consider none of these possibilities because of missing data.

Finally, we do not know the exact date of the beginning of the treatment of the second group. The earliest possible treatment year is 1881 when Bismarck explained his plan to establish a social security system in the *Reichstag* (German parliament). This public announcement might have already affected workers' long-term expectations and therefore their savings activities. The latest possible treatment year is 1891 when the pension insurance law became effective. Workers might have changed their savings behavior only after they had actually started to contribute to the pension insurance. To deal with this methodological imprecision we interact the different groups with year dummies in our quantitative analysis.

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[49] Group ‹untreated› includes persons without profession, that is persons whose income was generated by capital assets as well as persons who lived in governmental facilities such as mental institutions or prison. It also includes dependent persons without own income such as wives, children and elderly people.

[50] Since the newly-established social insurance promised economic support when the breadwinner became sick, disabled or died, dependents now faced less incentive to build up their own savings deposits in order to provide for major life risks. The statistics do not reveal, however, which share of the absolute number of dependent people were part of the newly-treated households of industrial workers. If at all, children or housewives of more wealthy families held their own savings accounts. See Wysocki (1980), p. 77 et seq.

[51] Borscheid (1988).

4. Data

The Prussian statistical yearbook (*Zeitschrift des Königlich Preußischen Statistischen Landesamts*) regularly provided a detailed statistical description of the business activities of the Prussian savings banks. For most of the years in our observation period, however, this information has been aggregated on the level of the 13 Prussian provinces or the 35 *Regierungsbezirke*, the middle administrative level of the Prussian state. Only for some years, the statistics offer data about every single Prussian savings bank including its number of savings accounts and total deposits. In our observation period, these data are available for the eight calendar years 1874, 1875, 1882, 1888, 1897, 1898, 1903, and 1904.[52] To get a more disaggregated picture of the geographical distribution of savings activities across Prussia we assigned each individual savings bank to its appropriate county (in the borders of 1871) which is the lower administrative level of the Prussian state.

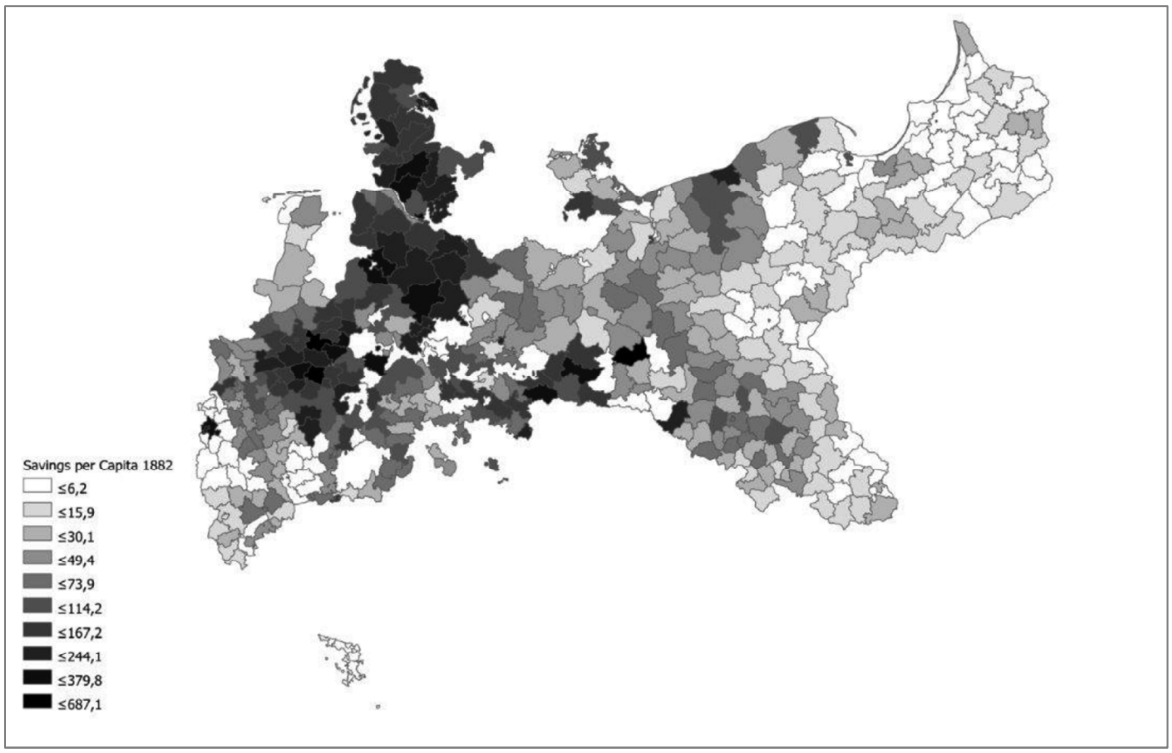
As a result, we observe savings activities in up to 436 Prussian counties for eight benchmark years in the period from 1874 to 1904.[53] Three years (1874, 1875, 1882) lie before the introduction of the first pillar of Bismarck's social security system (health insurance in 1883), five years (1888, 1897, 1898, 1903, 1904) cover the period afterwards. Wysocki notes that the average German saver made only one or two deposits at her savings bank per year.[54] In the interim, private savings were accumulated at home. Given the low frequency of individual bank payments our annual data seem to be sufficient to identify the impact of social security on private savings in the late nineteenth century. Although not codified in each and every statute, savings banks usually only accepted savers that lived in the boundaries of the county where the respective savings bank was located. That is why local savings deposits are a good indicator for the local propensity to save.

[52] The data are published in the volumes 1876, 1884, 1890, 1900 and 1906 of the *Zeitschrift des Königlich Preußischen Statistischen Landesamts*.

[53] Sometimes, an urban county's savings bank also served clients who lived in the surrounding rural county (that might have had the same name as the urban county). In these cases, we merged the urban county and the rural county.

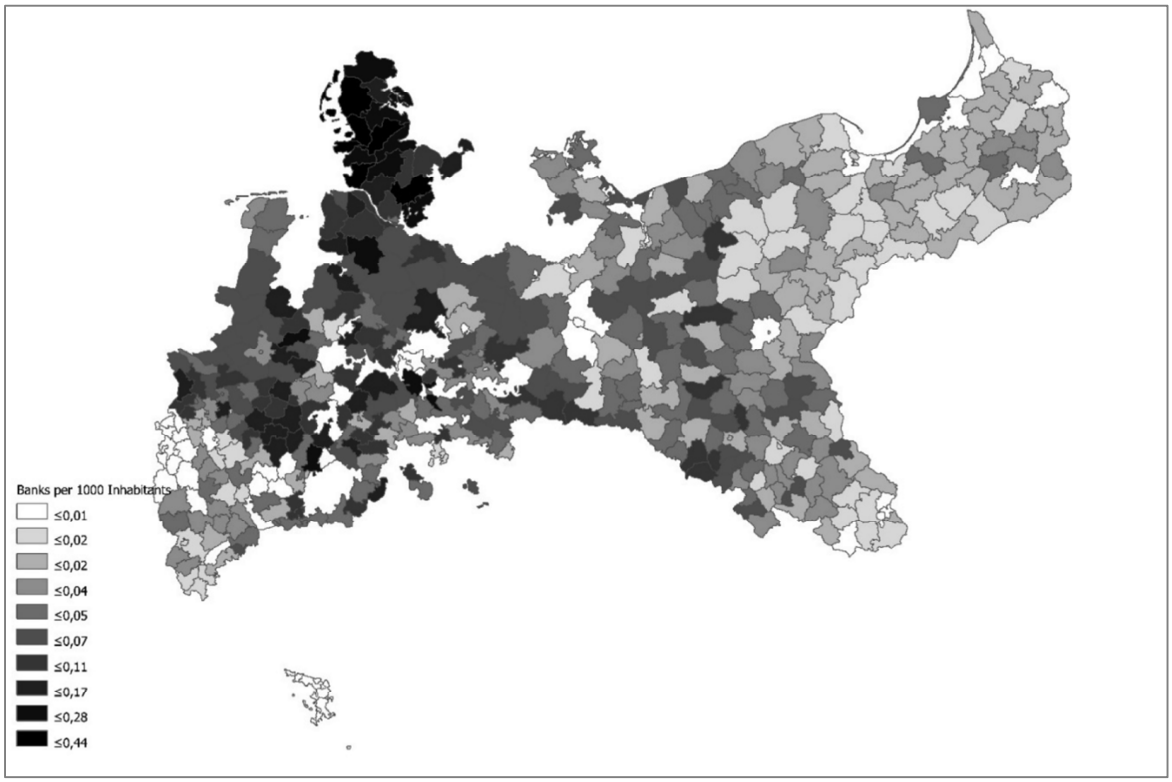
[54] Wysocki (1980), p. 84.

Figure 1: Savings Banks' Deposits per capita in Prussian Counties (1882)



Source: See text.

Figure 2: Savings Banks per capita in Prussian Counties (1882)



Source: See text.

Figures 1 and 2 show that both the amount of savings banks' deposits per capita and the number of savings banks per capita were by no means equally distributed across Prussian counties. The highest savings activities can be found in the *Regierungsbezirke Schleswig, Hannover*, Westphalia and Rhineland. In the Eastern provinces of Prussia, savings activities were comparatively low. Ashauer suggests that these differences can be explained by cultural peculiarities.[55] People from northern Schleswig were known as particularly ‹thrifty› (or even stingy); people from the Rhineland were ‹venturous›, and the inhabitants of the province Posen in the east had a low ‹sense of security› and therefore shied away from entrusting a bank with their money. Notwithstanding Ashauer's cultural explanation, it is clear that we do not observe the geographical distribution of Prussian counties' *total* savings as we do not have information about, for example, households' cash hoarding or savings at other financial institutions such as credit cooperatives[56] or private insurance companies. Regional differences in savings banks' deposits per capita might (partly) result from the use of different forms of saving and not from different culture-driven propensities to save. To control for regional trends in savings activities we interact both a county's longitude and its latitude with the year dummies.

Another methodological problem arose from the fact that some of the savings banks considered in our empirical analysis did not exist before 1874 but were only founded during our period of observation. The founding of a particular county's first savings bank inevitably led to a sharp rise in this county's registered savings because it gave many not-so-wealthy local people for the first time the possibility to deposit their former cash hoardings at this type of financial institution. By excluding the 38 counties that did not have a working savings bank before 1874 from the regression analysis we control for this distorting effect. This reduces the number of counties in our sample to 398.

Information about the distribution of employees across occupational groups are taken from the ifo Prussian Economic History Database.[57] The original source for these data is the Prussian occupation census of 1882.[58] Figures 3a, 3b, and 3c show how the different control groups (already treated, untreated, and only partly treated) were distributed across Prussia.

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55 Ashauer (1998), p. 56.

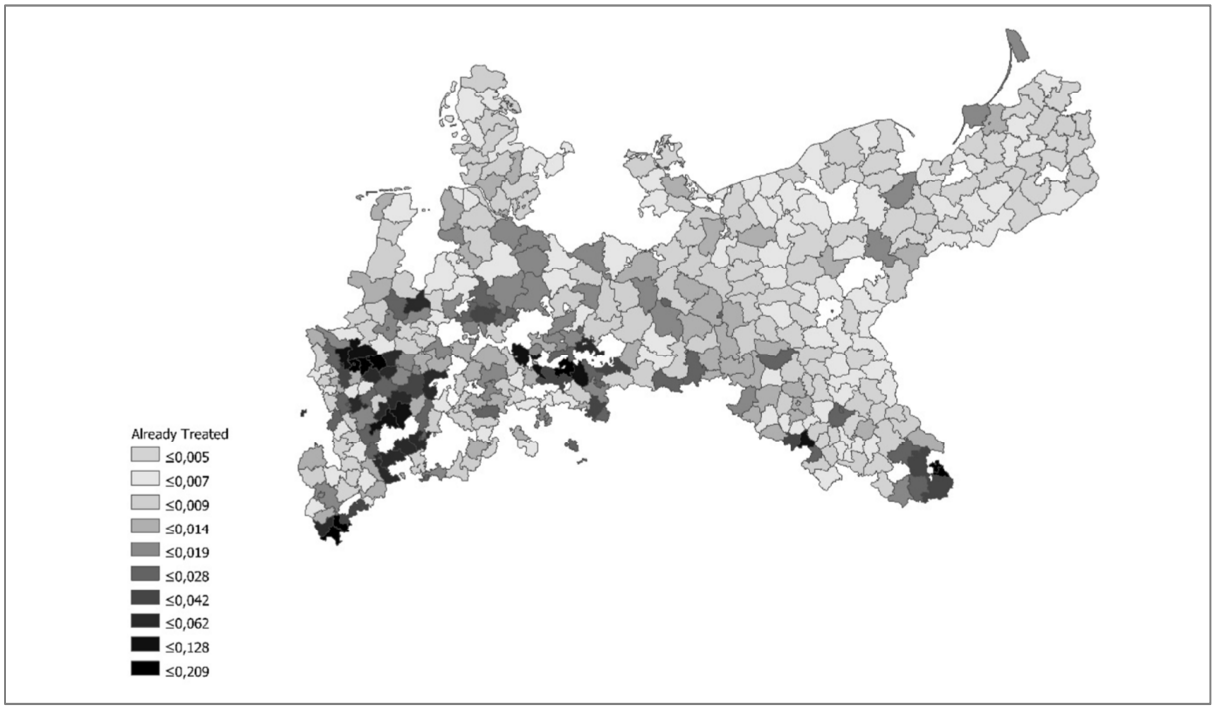
56 Credit cooperatives might have been especially important in rural counties where agricultural production still dominated. See Guinnane (2001).

57 Becker / Cinnirella / Hornung / Wößmann (2014).

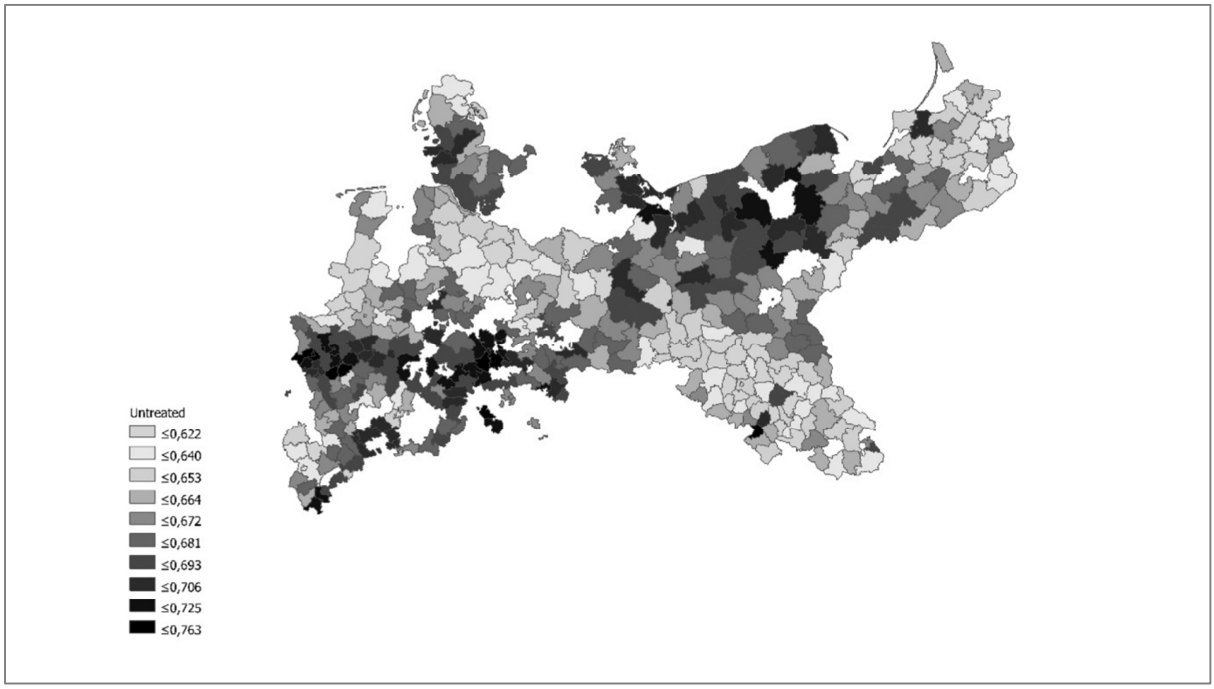
58 We assume that, within counties, the distribution of these occupational groups did not significantly change in the following two decades.

Figure 3: The Different Control Groups in Percentage of Total Population in Prussian Counties (1882), excluding Counties that had no Saving Bank in 1874

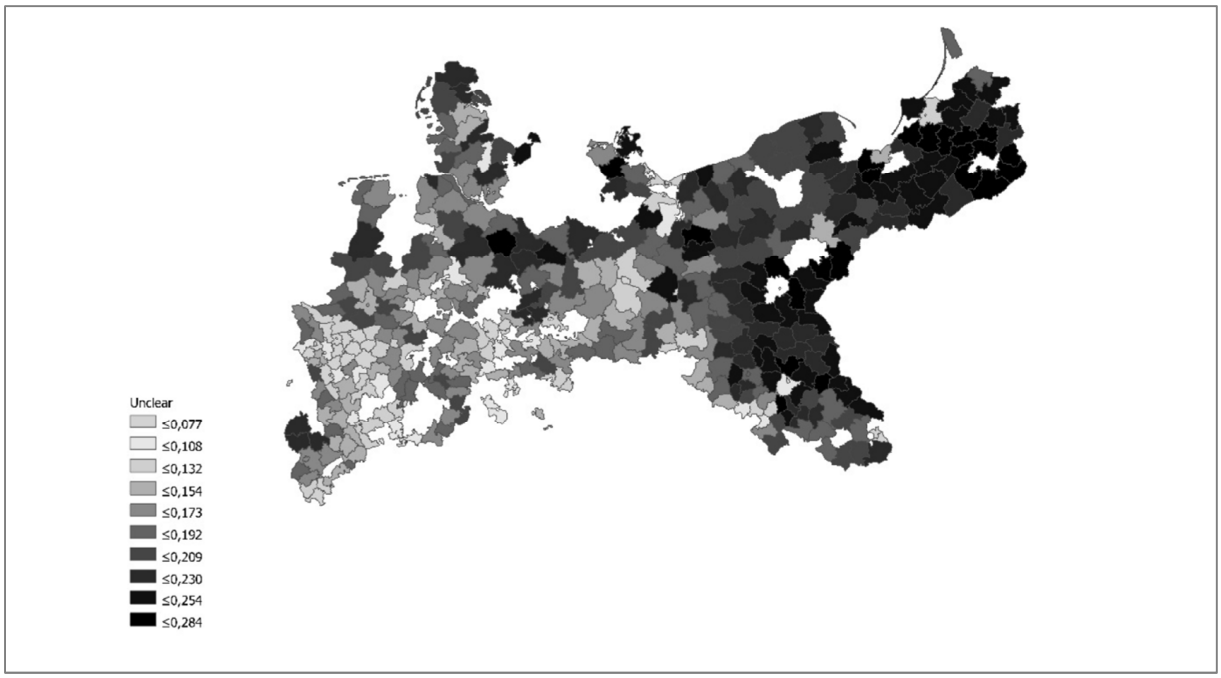
a. ‹Already treated›



b. ‹Untreated›



c. ‹Only partly treated›



Source: See text.

Naturally, the share of already treated savers was comparatively large in the Prussian regions with rich deposits of coal and nonferrous metals where miners were concentrated, namely in the provinces Rhineland, Westphalia, Saxony, and Silesia. Measured by income tax revenues per capita or patented innovations, these Prussian provinces were also among the most advanced in economic terms.[59] Before the introduction of Bismarck's social security system, relative savings activities in miners' counties were therefore subject to two countervailing influences. On the one hand, given a constant marginal propensity to save, miners (and other workers in these counties) might have saved more because they had a higher average income at their disposal than the people in the less developed non-mining counties. On the other hand, miners might have had a comparatively low marginal propensity to save (and saved less than non-miners) because they were already entitled to invalidity pensions and sick pay. It is also interesting to note that the share of persons that are only partly treated, that is farm workers and domestic servants, is highest in the eastern and northern parts of Prussia.

[59] Cinnirella / Streb (2017).

Table 2: Descriptive Statistics

		savings pop	savings hh	Regional income index	average size hh	share women	share old	share urban
1874	mean	41.32	196.13	594.24	4.75	0.51	0.03	0.28
	sd	54.82	264.06	89.48	0.35	0.02	0.01	0.19
1875	mean	46.36	219.93	609.65	4.75	0.51	0.03	0.28
	sd	61.46	295.83	90.37	0.35	0.02	0.01	0.19
1882	mean	70.41	340.39	565.19	4.82	0.50	0.03	0.29
	sd	84.84	418.76	95.54	0.35	0.01	0.01	0.19
1888	mean	101.49	486.12	592.75	4.75	0.51	0.03	0.30
	sd	106.50	526.07	105.73	0.38	0.02	0.01	0.20
1897	mean	153.93	730.53	663.31	4.73	0.51	0.03	0.32
	sd	140.97	688.89	115.77	0.43	0.02	0.01	0.20
1898	mean	163.13	774.09	683.21	4.73	0.51	0.03	0.32
	sd	146.09	713.73	116.86	0.43	0.02	0.01	0.20
1903	mean	203.57	960.41	738.40	4.72	0.51	0.03	0.33
	sd	167.40	811.48	120.60	0.45	0.02	0.01	0.20
1904	mean	218.11	1028.87	752.08	4.72	0.51	0.03	0.33
	sd	176.52	854.63	122.89	0.45	0.02	0.01	0.20
Total	mean	124.79	592.06	649.85	4.75	0.51	0.03	0.31
	sd	141.11	682.32	126.35	0.40	0.02	0.01	0.20
	min	0.01	0.02	438.42	2.90	0.45	0.01	0.00
	max	1856.38	8244.21	1332.60	5.81	0.74	0.06	1.00

Source: See text.

Table 2 presents the mean value and standard variation for our main dependent and explanatory variables. Additional control variables were taken from the ‹Galloway Prussia Database 1861 to 1914›.[60] In the late nineteenth century, Prussia's industrialization came along with a steady growth in real income. All other things equal, we would expect individual savings to increase parallel to real disposable income. To consider this general income effect, we employ year dummies.

One might argue, however, that the wages of the control group rose faster than that of the group of ‹newly treated› (which would also explain why the savings of the latter grew slower than those of the former). Gumbach and König (1957 [2005]) provide information on the development of wages in Imperial Germany. They show that the income of miners did not increase faster than

[60] See Galloway (2007). His data are not available for all years. That is why we matched Galloway's data for the year 1875 with our data on saving banks for the years 1874 and 1875. Saving banks' data from 1882 were associated with Galloway's data from the same year and the year 1880; saving banks' data for 1888 with Galloway's data from 1890. Saving banks' data for the years 1897 and 1898 are matched with Galloway's data from the year 1900; saving banks' data for the years 1903 and 1904 with Galloway's data for 1905.

that of industrial worker.[61] Hoffmann's estimates confirm this finding.[62] Selgert studied living standards of public servants in the region Baden in the period 1780 to 1913.[63] He finds that the relative position of public servants in the income distribution seemed to deteriorate from the second half of the nineteenth century onwards when blue collar workers' real wages started to increase while district magistrates' remuneration stagnated or even decreased. On balance, these studies suggest that the income of the group of newly treated grew at least as fast as the income of the other groups. To be able to control for countyspecific income growth[64] we constructed a regional income index by weighting information on occupation-specific wage growth with a county's occupational structure.[65] All other things equal, we expect counties with higher average income to have also higher savings.

We also control for the share of old (above 70 years) and the share of women in a district's population thereby accounting for potential gender specific differences in risk aversion and preference for saving. Because urban populations often had higher incomes at their disposal, we include the share of population that lived in cities. As we cover a relatively short period of 29 years, we suppose that other factors which might affect savings activities such as religion or culture remain constant and are therefore captured in the fixed effects.[66]

5. Empirical Analysis

We analyze the impact of social security on private savings at the level of Prussian counties with the help of three alternative measures for the dependent variable, all in natural logarithm. Most importantly, we consider as dependent variable the amount of savings banks' deposits per capita (*lnsavingspop*). In addition, we use information about the number of savings accounts per capita (*lnaccountspop*) and savings per account (*lnsavingsaccount*). By comparing savings activities in

[61] Gumbach / König (1957 [2005]).
[62] Hoffmann(1965), pp. 492 et seq.
[63] Selgert (2013).
[64] Simply relying on year fixed effects would imply that Prussian counties' average real wages grew in a uniform manner. This assumption is rather unrealistic as not only the imbalanced distribution of patenting activities across Prussian regions suggests. For patent statistics and other indicators of Prussian counties' economic performance see Becker / Wößmann (2009), Cinnirella / Streb (2017), Lehmann-Hasemeyer / Streb (2016a), and Streb / Baten / Yin (2006).
[65] Wage data are taken from Hoffmann (1965), pp. 468-471; see Tables A1 and A2 and Figure A1 in the appendix.
[66] Savings banks' interest rates hardly changed over time and ranged between 2.5 and 4.5 percent (Ashauer (1998), p. 58). The fact that interest rates were generally higher in the Western provinces of Prussia is covered by the county fixed effects.

Prussian counties that differ with respect to their share of persons with a high likelihood to be affected by Bismarck's social security system, our estimation strategy follows the same logic as a standard differences-in-differences approach. The special feature of our method is the use of continuous measures for the intensity of the treatment, thereby making better use of the variation in the data. Our main hypothesis is that, after the introduction of Bismarck's social security system, savings grew more slowly in counties with a large share of newly treated employees than in counties with a comparatively small share of this group because in the former counties relatively many people started to replace private savings with social insurance.

In a first step, we interact each group that was probably hardly affected by Bismarck's social reform (‹already treated›, ‹untreated› and ‹only partly treated›) with every observation year. In general, we expect the coefficients of this interaction terms to become positive after the introduction of Bismarck's social security system. In Tables 3, which presented the regression results for the dependent variable savings per capita (*lnsavingspop*), we stepwise add these groups to the regression. Note that with the gradual inclusion of more and more groups in the regression the implicit control group narrows down. In the regressions 1 and 4, we just interact the group of ‹already treated› with the observation years. As a result, the control group covers all remaining occupations. In the regressions 2 and 5, we add the group of ‹untreated›, which should not change the main results since we expect no major changes in savings behavior from this group. In the regressions 3 and 6 we also explicitly consider the group of ‹only partly treated› from which we do not know what to expect.

It is possible that the introduction of Bismarck's social security system, that addressed first and foremost industrial workers, might have played only a minor role in counties that were still dominated by agriculture. That is why we run our regression also for a subsample that only includes the 343 Prussian counties where the share of agricultural workers was below 20 percent (see regressions 4-6).[67] Furthermore, we use the interaction terms ‹longitude*year dummy› and ‹latitude*year dummy› as geographical controls. All our models are estimated with year and county fixed effects and clustered standard errors at the level of counties.

[67] We provide a map of the subsample in the Appendix. See Figure A2.

Table 3: The Impact of Bismarck's Social Security System on Savings

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES			lnsavingspop			
		all counties		if share of agricultural workers is less than 20%		
1875 * alreadytreated	-1.347***	-1.555***	-1.631**	-1.329***	-1.499***	-1.822**
	(0.389)	(0.412)	(0.729)	(0.417)	(0.441)	(0.744)
1882 * alreadytreated	-3.063**	-3.884***	-2.725	-2.845**	-3.619**	-3.405
	(1.322)	(1.421)	(2.445)	(1.332)	(1.448)	(2.438)
1888 * alreadytreated	-2.987*	-4.125**	-3.876	-3.171*	-4.187**	-4.810
	(1.640)	(1.739)	(2.971)	(1.662)	(1.769)	(2.939)
1897 * alreadytreated	-0.165	-0.754	-0.310	-0.553	-1.102	-1.250
	(1.754)	(1.753)	(2.303)	(1.736)	(1.740)	(2.264)
1898 * alreadytreated	0.255	-0.265	0.301	-0.139	-0.628	-0.602
	(1.770)	(1.764)	(2.198)	(1.753)	(1.751)	(2.159)
1903 * alreadytreated	-0.157	-0.777	-0.150	-0.596	-1.205	-1.214
	(1.876)	(1.876)	(2.348)	(1.871)	(1.881)	(2.332)
1904 * alreadytreated	0.293	-0.335	0.267	-0.162	-0.785	-0.832
	(1.897)	(1.890)	(2.340)	(1.888)	(1.893)	(2.326)
1875 * untreated		-0.0936	-0.350		-0.236	-0.603
		(0.228)	(0.432)		(0.279)	(0.463)
1882 * untreated		1.464	2.330		1.907	2.202
		(1.437)	(1.626)		(1.475)	(1.569)
1888 * untreated		3.453**	3.144		3.638***	2.942
		(1.365)	(1.927)		(1.380)	(1.911)
1897 * untreated		3.247*	3.887*		3.407**	3.316
		(1.653)	(2.255)		(1.682)	(2.282)
1898 * untreated		3.252*	4.175*		3.396**	3.537
		(1.674)	(2.265)		(1.709)	(2.295)
1903 * untreated		3.858**	4.959**		4.226**	4.364*
		(1.815)	(2.486)		(1.839)	(2.514)
1904 * untreated		4.169**	5.296**		4.608**	4.711*
		(1.841)	(2.541)		(1.863)	(2.574)
1875 * only partly treated			-0.309			-0.464
			(0.384)			(0.399)
1882 * only partly treated			0.973			0.364
			(1.569)			(1.552)
1888 * only partly treated			-0.283			-0.932
			(2.064)			(2.037)
1897 * only partly treated			0.935			-0.116
			(2.356)			(2.385)
1898 * only partly treated			1.285			0.190
			(2.351)			(2.382)
1903 * only partly treated			1.576			0.213
			(2.766)			(2.809)
1904 * only partly treated			1.633			0.170
			(2.870)			(2.922)
lnincome	13.50**	16.18**	9.755	11.54	13.68*	12.07
	(6.849)	(7.271)	(12.82)	(7.075)	(7.491)	(13.18)
lnincome squared	-1.395**	-1.654***	-1.127	-1.236**	-1.447**	-1.331
	(0.562)	(0.601)	(1.066)	(0.575)	(0.615)	(1.095)

lnavhhsize	2.508**	2.507**	2.318**	2.123*	2.129*	2.050*
	(1.035)	(1.025)	(1.058)	(1.161)	(1.147)	(1.198)
sharewomen	4.559*	4.046*	3.752*	3.032	2.503	2.402
	(2.361)	(2.248)	(2.253)	(2.295)	(2.162)	(2.193)
shareold	45.33***	42.69***	42.28***	43.21***	40.43***	40.24***
	(9.527)	(9.530)	(9.639)	(10.12)	(10.15)	(10.25)
shareurban	0.357	0.483	0.501	0.570	0.707	0.705
	(0.465)	(0.465)	(0.462)	(0.460)	(0.459)	(0.456)
constant	-34.04*	-40.30*	-20.34	-26.36	-31.07	-25.39
	(20.42)	(21.49)	(38.71)	(21.17)	(22.21)	(39.92)
year fixed effects and geographic controls	y	y	y	y	y	y
observations	3,184	3,184	3,184	2,744	2,744	2,744
R-squared	0.815	0.816	0.817	0.800	0.802	0.802
number of counties	398	398	398	343	343	343

Clustered standard errors in parentheses, clustered at the level of counties *** p<0.01, ** p<0.05, * p<0.1.

The first notable result is that the savings behavior of the group of ‹already treated› fits very well our expectations. While this group saved significantly less than the control group until 1888, the coefficient of the interaction variable becomes insignificant afterwards, which indicates a convergence to the control group. This result is robust over all control groups and subsamples. The results for the group of ‹untreated› is equally robust: Savings per capita again increased in comparison to the (remaining) control group. As the ‹untreated› could still not rely on a social security system they had to save relatively more than the ‹newly treated› and ‹only partly treated›. The relative savings activities of the ‹only partly treated› show a positive trend, albeit not significantly. With respect to all groups, there is no significant difference between the full sample and the subsample of industrial counties.

To quantify the effects, which the introduction of Bismarck's social security system had on the saving behavior of the treated savers, we address three different approximations of the real treatment group:

Newly treated 1 (T1) is defined as [(Total workforce minus already treated)/Total workforce of the county]. The nominator is the equivalent to the control group in regression 1 and 4 of table 3).

Newly treated 2 (T2) is calculated as [(Total workforce minus already treated minus untreated)/Total workforce of the county]. Here, the nominator is the equivalent to the control group in regression 2 and 5 of table 3.

Newly treated 3 (T3) is calculated as [(Total workforce minus already treated minus untreated minus only partly treated)/Total workforce of the county]. Here, the nominator is the equivalent to the control group in regression 3 and 6 of table 3.

Table 4 provides the results.[68] For all three specifications, we clearly see the expected downward trend in the treatment group's relative savings activities after the introduction of Bismarck's social insurance system. For the first treatment group T1, the sign of the year-specific interaction term's coefficient is significantly positive before 1888 and insignificant afterwards. For the second and third treatment groups T2 and T3, the sign of the year-specific interaction term's coefficient becomes negative after 1888, but significantly only in the latter case. The finding that the crowding-out effect increased over time implies that Prussian workers needed time to understand the economic implications of compulsory social security. Only after experiencing that social insurance benefits were provided by the government as originally promised they did change their long-term expectations and saved less.

Table 4: Quantifying the Crowding Out of Private Savings

	(1)	(2)	(3)
VARIABLES		lnsavingspop	
	T1	T2	T3
T*1875	1.337***	0.615***	0.248
	(0.388)	(0.216)	(0.314)
T*1882	2.811**	0.607	-1.667
	(1.271)	(0.862)	(1.315)
T*1888	2.814*	-0.206	-1.267
	(1.623)	(0.956)	(1.612)
T*1897	0.343	-1.169	-2.613
	(1.757)	(1.130)	(1.662)
T*1898	0.00713	-1.321	-2.889*
	(1.768)	(1.144)	(1.641)
T*1903	0.553	-1.344	-3.109*
	(1.863)	(1.224)	(1.850)
T*1904	0.152	-1.658	-3.324*
	(1.878)	(1.251)	(1.892)
lnincome	8.162	9.219*	1.381
	(5.165)	(5.271)	(6.051)
lnincome squared	-0.978**	-1.037**	-0.327
	(0.427)	(0.425)	(0.475)
lnavhhsize	2.601**	2.731***	2.317**
	(1.027)	(1.021)	(1.036)
sharewomen	4.677**	4.294*	3.778*
	(2.339)	(2.212)	(2.271)
shareold	45.70***	46.36***	45.48***
	(9.559)	(9.428)	(9.458)
shareurban	0.337	0.361	0.396
	(0.466)	(0.463)	(0.460)
constant	-17.08	-21.46	0.534
	(15.37)	(16.03)	(19.32)
year fixed effects and geographic controls	y	y	y
observations	3,184	3,184	3,184
R-squared	0.814	0.815	0.815
number of counties	398	398	398

Clustered standard errors in parentheses, clustered at the level of counties
*** p<0.01, ** p<0.05, * p<0.1.

[68] For robustness checks, see also Table A3 in the appendix.

One might argue that the negative sign of the interaction term does not indicate crowding out but simply reflects the fact that, after 1882, the income of the control group rose faster than that of the treatment group. To consider the impact of occupation-specific income growth, we control for average income (*lnincome*) and average income squared (*lnincome squared*). Obviously, the relationship between workers' average income and savings is non-linear. The estimation results suggest that private savings (deposited at savings banks) first increased with rising prosperity, but dropped again after a certain threshold. The latter effect might be driven by additional investment options wealthier savers had (or by the fact that some savings banks had upper limits for saving accounts). The initially positive temporal income effect also explains why both contemporaries and historians so far failed to recognize the crowding out effect that took place despite increasing savings in absolute terms.

Table 5: Alternative Dependent Variables

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES		lnaccountspop			lnsavingsaccount	
	T1	T2	T3	T1	T2	T3
T*1882	0.597	-0.655	3.529**	1.387**	0.929**	0.0108
	(0.794)	(0.608)	(1.388)	(0.667)	(0.472)	(0.738)
T*1888	0.378	-1.245*	1.735	1.629**	0.698	0.234
	(1.031)	(0.685)	(1.270)	(0.791)	(0.435)	(0.665)
T*1897	-1.755	-2.229**	2.106**	1.010	0.590	0.297
	(1.236)	(0.878)	(1.060)	(0.714)	(0.476)	(0.554)
T*1898	-2.292*	-2.516***	0.756	1.163	0.707	0.107
	(1.292)	(0.902)	(0.737)	(0.715)	(0.478)	(0.267)
T*1904	-2.682*	-2.968***	0.522	1.669**	0.825*	0.0270
	(1.406)	(0.982)	(0.676)	(0.728)	(0.495)	(0.228)
lnincome	12.62***	12.36***	3.196	-2.150	-1.975	-2.429
	(4.344)	(4.136)	(4.548)	(2.553)	(2.454)	(2.508)
lnincome squared	-1.249***	-1.227***	-0.399	0.0679	0.0672	0.0898
	(0.374)	(0.346)	(0.362)	(0.217)	(0.202)	(0.193)
lnavhhsize	1.066	1.190	0.834	1.104**	1.121**	1.100**
	(0.754)	(0.743)	(0.751)	(0.472)	(0.473)	(0.487)
sharewomen	2.802	2.244	2.055	1.604	1.671	1.448
	(1.988)	(1.746)	(1.921)	(1.068)	(1.065)	(1.085)
shareold	36.59***	36.37***	35.79***	3.239	3.866	4.122
	(6.859)	(6.850)	(6.818)	(4.078)	(4.049)	(4.107)
shareurban	0.407	0.470	0.471	-0.152	-0.178	-0.175
	(0.333)	(0.324)	(0.325)	(0.240)	(0.242)	(0.240)
constant	-36.74***	-35.91***	-11.02	14.44*	13.28*	15.40*
	(12.55)	(12.24)	(14.40)	(7.681)	(7.628)	(8.503)
year fixed effects and geographic controls	y	y	y	y	y	y
observations	2,387	2,387	2,387	2,387	2,387	2,387
R-squared	0.755	0.757	0.756	0.487	0.486	0.484
number of counties	398	398	398	398	398	398

Clustered standard errors in parentheses, clustered at the level of counties
*** p<0.01, ** p<0.05, * p<0.1.

In Table 5, we run the same regression for two additional dependent variables, namely the number of savings accounts per capita (*lnaccountspop*) and savings per account (*lnsavingsaccount*). For

these variables, we have data only for the years 1875, 1882, 1888 and 1904. Interestingly enough, for all three approximations of the real treatment group, we observe a negative trend for the number of savings accounts per capita. Apparently, newly treated Prussian workers opened up less additional savings accounts after the introduction of Bismarck's social security system. Savings activities also declined at the extensive margin.

The question remains whether this crowding-out effect was also economically significant. To get an idea about its magnitude we used model 3 of Table 4 to calculate the counterfactual savings per capita that would have occurred if Bismarck's social security system would not have been introduced – which means that we neglected all year-specific interaction terms. Figures 4 and 5 show the results of this exercise. At the mean, savings per capita in a counterfactual world without social security would have been about 117 marks higher than in the historical world of the year 1904.[69] This equals about 15 percent of an average annual income and about 54 percent of the actual savings per capita. Based on data provided by Jopp,[70] we can estimate that, around 1900, the present value of a workers' pension claim ranged between 1,500 and 2,500 marks (which equaled about two annual incomes). Obviously, although the crowding out effect was economically significant, compulsory social security contributions did clearly not just replace voluntary precautionary savings. This is even more true as the insured workers' expected benefits were not limited to pension claims but also included the substantial financial support they would receive in the cases of sickness and invalidity. The total financial gain that came along with Bismarck's social security was clearly considerably larger than the decrease in private savings.

[69] See also Table A4 in the appendix.
[70] Jopp (2016).

Figure 4: The Magnitude of the Crowding-out Effect, based on Treatment 3 in all Counties

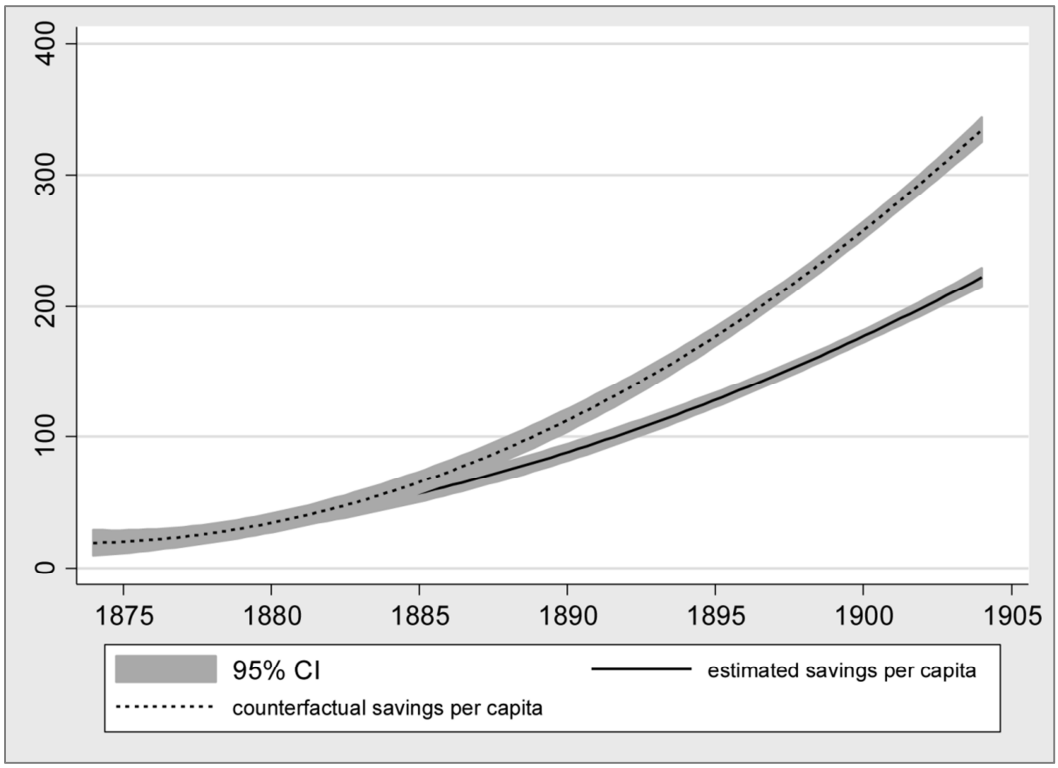
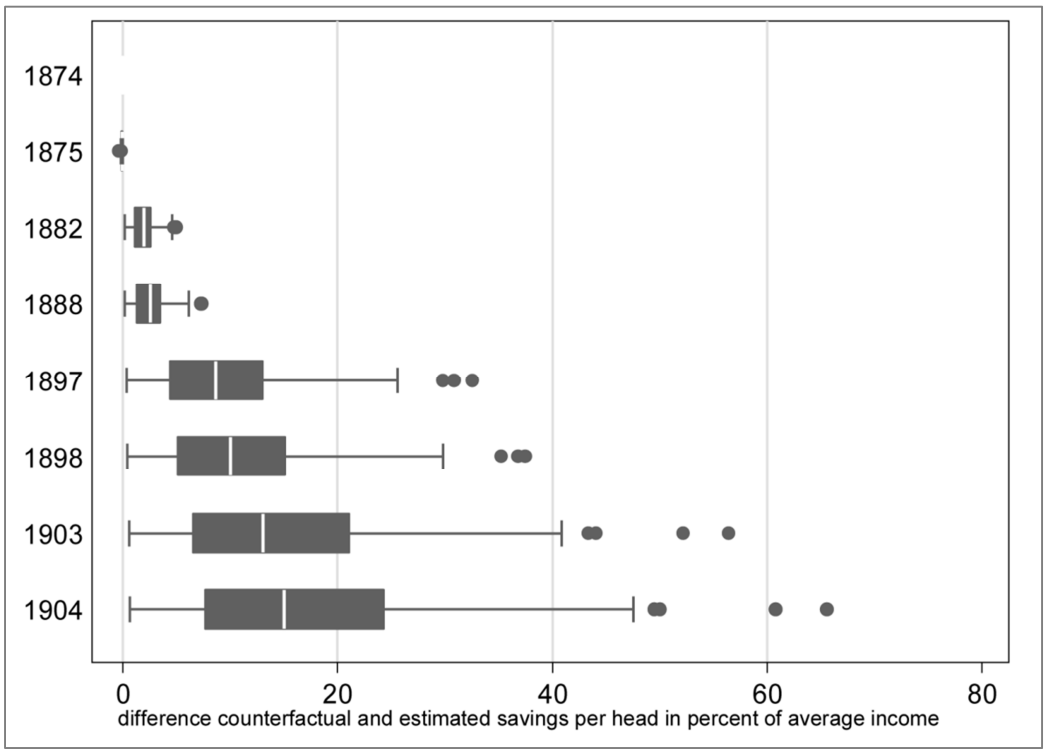


Figure 5: The Magnitude of the Crowding-out Effect, based on Treatment 3 in all counties



Finally, did age matter? As discussed above, Attanasio and Rohweder[71] and Attanasio and Brugiavini[72] find that the effects of pension wealth on savings can vary across age groups. In England, the effect was largest for nearly retired individuals, whereas, in Italy, younger people were more sensitive to changes in their expected pension claims. To identify such age effects in our sample, we divided the working population of the Prussian counties in the two groups ‹young› (20-49) and ‹old› (50-70) and ran our baseline regression (see model 3 in Table 4) for different subsamples of counties in which either the young or the old group dominated. Table 6 presents the results. It seems that it was rather the young workers who changed their savings behavior after the introduction of Bismarck's social security system.

[71] Attanasio / Rohweder (2003).
[72] Attanasio / Brugiavini (2003).

Table 6: Age Effects, Regression with Different Subsamples

VARIABLES	(1) all	(2) 50% of counties in which m1/m is largest	(3) 25% of counties in which m1/m is largest	(4) 50% of counties in which m2/m is largest	(5) 25% of counties in which m2/m is largest
1875*T3	0.248	-0.374	0.0524	1.372**	1.106
	(0.314)	(0.371)	(0.553)	(0.682)	(0.852)
1882*T3	-1.667	-2.662*	0.557	-1.803	-7.399**
	(1.315)	(1.605)	(2.057)	(2.204)	(3.087)
1888*T3	-1.267	-2.481	1.214	-0.568	-5.972
	(1.612)	(2.045)	(2.682)	(2.560)	(3.720)
1897*T3	-2.613	-4.276**	-1.125	-0.0427	-2.898
	(1.662)	(2.053)	(2.487)	(2.888)	(4.944)
1898*T3	-2.889*	-4.436**	-1.439	-0.273	-2.333
	(1.641)	(2.026)	(2.446)	(2.884)	(5.064)
1903*T3	-3.109*	-4.634**	-1.300	-1.935	-7.948
	(1.850)	(2.177)	(2.733)	(4.007)	(8.207)
1904*T3	-3.324*	-4.643**	-1.326	-2.246	-7.726
	(1.892)	(2.195)	(2.746)	(4.067)	(8.349)
lnincome	1.381	6.980	2.514	19.80	61.71**
	(6.051)	(7.585)	(9.201)	(13.03)	(31.17)
lnincome squared	-0.327	-0.624	-0.397	-2.087**	-4.986*
	(0.475)	(0.591)	(0.700)	(1.056)	(2.578)
lnavhhsize	2.317**	-0.690	-3.310*	4.614**	6.807***
	(1.036)	(1.468)	(1.966)	(1.903)	(2.308)
sharewomen	3.778*	-2.098	-7.370**	4.139	8.806
	(2.271)	(2.706)	(3.331)	(8.566)	(11.05)
shareold	45.48***	33.28***	45.75**	66.76***	86.49***
	(9.458)	(12.29)	(19.65)	(17.55)	(20.78)
shareurban	0.396	-0.214	0.494	1.340	1.678
	(0.460)	(0.659)	(0.657)	(0.969)	(1.489)
constant	0.534	-14.76	11.28	-50.34	-205.8**
	(19.32)	(24.26)	(31.85)	(41.58)	(97.89)
year fixed effects and geographic controls	y	y	y	y	y
observations	3,184	1,593	796	1,591	796
R-squared	0.815	0.834	0.830	0.798	0.815
number of counties	398	264	141	269	173

Note: m1 is the share of people age 20-49 and m2 is the share of people aged 50-70. M is the sum of m1 and m2. Clustered standard errors in parentheses, clustered at the level of counties.
*** p<0.01, ** p<0.05, * p<0.1

6. Conclusion

Politicians – both today and in the past – usually justify the introduction of compulsory social security systems with ordinary people's incapacity and unwillingness (because of moral hazard) to provide self-reliantly for life risks such as old age, invalidity, and sickness. This was also true when chancellor Bismarck introduced the German system of social insurance with its three pillars health, accident, and pension insurance in the 1880s, considered the birth of the modern welfare state. In contrast, opponents of the expansion of the welfare state argue that social security systems are paternalistic and crowd out prudent individuals' precautionary measures and are therefore unnecessary.

Analyzing the impact of social security on private savings in late-nineteenth century Prussia we found evidence for both views. Our regression analysis suggests that the introduction of social security for large parts of the Prussian population indeed crowded out private savings. We can only speculate whether workers would have used their growing real wages to provide self-reliantly for life risks if Bismarck's social security system would not have been established. However, given that the estimated accumulated crowding out effect only comes to about 15 percent of a worker's annual income, it is highly unlikely that the additional private savings would have been high enough to provide for sickness, accident and old age as good as Bismarck's social security system did. Although the willingness to take precautions was there, the overall savings were and would have been far from sufficient. That is why Bismarck's social insurance system was needed to fight the misery workers and their families potentially faced in old age or times of sickness.

Appendix: Calculating the Average Income of Employees per County

Table A1: Average Yearly Income in Mark for Different Occupation Groups

Year	1874	1875	1882	1888	1897	1898	1903	1904
Agriculture	449	471	407	408	461	480	528	536
Mining	1013	966	788	804	1041	1087	1150	1175
Metal production	955	925	820	850	990	1017	1157	1192
Metal working	792	828	810	846	932	979	1051	1079
Textiles	443	460	460	494	561	571	620	631
Wood	868	927	614	790	859	881	974	974
Print	1252	1252	1198	1266	1244	1308	1244	1256
Construction	856	824	751	866	956	999	1083	1106
Industry general	685	696	614	708	809	835	914	938
public sector employment	1512	1647	1821	1919	1993	1999	2081	2098
Traffic	930	877	855	907	1061	1049	1168	1198
Trade, banks, insurance	703	686	656	698	793	813	877	901
Domestic servants	439	409	428	430	491	502	537	555
other services	1563	1730	1855	1948	2029	2036	2120	2141

Source: Hoffmann (1965), pp. 468-471.

Table A2: Occupational Groups and Assigned Wage Series

Occupation	Description	Hoffmann Wage series
occ1882_emp_agr_tot	employee; agriculture, planting, cultivation; total amount of working people	Agriculture
occ1882_emp_for_tot	employee; forestry, fishing and hunting; total amount of working people	Agriculture
occ1882_emp_bui_tot	employee; building and construction industry; total amount of working people	Construction
occ1882_dom_tot	servant; total amount of working people	Domestic servants
occ1882_mai_tot	household services and day laborers; total amount of working people	Domestic servants
occ1882_emp_pos_tot	employee; postal service and railway and telegraph operation; total amount of working people	Domestic servants
occ1882_emp_jud_tot	employee; administration or judicature; total amount of working people	Domestic servants
occ1882_emp_rel_tot	employee; religious and educational services; total amount of working people	Domestic servants
occ1882_emp_lum_tot	employee; soap and wax; total amount of working people	Industry general
occ1882_emp_che_tot	employee; chemical industry; total amount of working people	Industry general
occ1882_emp_eng_tot	employee; engineering; total amount of working people	Industry general
occ1882_emp_pap_tot	employee; paper- and leather goods industry; total amount of working people	Industry general
occ1882_emp_sto_tot	employee; ground or treated mineral and earth manufacturing ; total amount of working people	Industry general
occ1882_emp_utb_tot	employee; untitled business; total amount of working people	Industry general
occ1882_emp_foo_tot	employee; food and beverages industry; total amount of working people	Industry general
occ1882_emp_met_tot	employee; metal processing; total amount of working people	Metal working
occ1882_emp_min_tot	employee; mining and steel mill operation; total amount of working people	Mining
occ1882_emp_res_tot	employee; religious and educational services; total amount of working people	other services
occ1882_emp_arm_tot	employee; military; total amount of working people	other services
occ1882_emp_hea_tot	employee; health care; total amount of working people	other services
occ1882_emp_pri_tot	employee; printing; total amount of working people	Print
occ1882_emp_clo_tot	employee; clothing manufacturing and drycleaning industry; total amount of working people	Textiles
occ1882_emp_tex_tot	employee; textile industry; total amount of working people	Textiles
occ1882_emp_btr_tot	employee; book stores and art dealers; total amount of working people	Trade, banks, insurance
occ1882_emp_fin_tot	employee; finance; total amount of working people	Trade, banks, insurance
occ1882_emp_ins_tot	employee; insurance; total amount of working people	Trade, banks, insurance
occ1882_emp_otr_tot	employee; other miscellaneous store retailers; total amount of working people	Trade, banks, insurance
occ1882_emp_trg_tot	employee; retail trade; total amount of working people	Trade, banks, insurance
occ1882_emp_car_tot	employee; cargo transportation; total amount of working people	Traffic
occ1882_emp_wtr_tot	employee; water transportation; total amount of working people	Traffic
occ1882_emp_woo_tot	employee; wood product manufacturing; total amount of working people	Wood

Source: Wage series (Hoffmann (1965), pp. 468-471), occupation groups (Becker / Cinnirella / Hornung / Wößmann (2014)).

Table A3: Quantifying the Crowding-out Effect, Robustness Checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES					lnsavingspop				
		T1			T2			T3	
T*1875	-0.00961	1.765***	1.337***	-0.00357	0.914***	0.615***	-0.406**	-0.179	0.248
	(0.237)	(0.394)	(0.388)	(0.150)	(0.216)	(0.216)	(0.177)	(0.222)	(0.314)
T*1882	0.712	3.680**	2.811**	1.027	1.877**	0.607	-6.120***	-3.046***	-1.667
	(1.451)	(1.648)	(1.271)	(0.932)	(0.924)	(0.862)	(1.029)	(1.068)	(1.315)
T*1888	1.787	2.862	2.814*	1.229	0.616	-0.206	-7.579***	-2.198*	-1.267
	(1.917)	(1.972)	(1.623)	(1.041)	(1.013)	(0.956)	(1.079)	(1.306)	(1.612)
T*1897	2.772	-0.890	0.343	2.304*	-0.423	-1.169	-9.259***	-3.335**	-2.613
	(2.411)	(2.240)	(1.757)	(1.336)	(1.261)	(1.130)	(1.288)	(1.596)	(1.662)
Z*1898	2.706	-1.378	0.00713	2.307*	-0.575	-1.321	-9.296***	-3.553**	-2.889*
	(2.433)	(2.266)	(1.768)	(1.349)	(1.284)	(1.144)	(1.305)	(1.620)	(1.641)
T*1903	3.102	-0.797	0.553	2.499*	-0.227	-1.344	-10.15***	-4.198**	-3.109*
	(2.543)	(2.404)	(1.863)	(1.418)	(1.353)	(1.224)	(1.446)	(1.831)	(1.850)
T*1904	2.776	-1.373	0.152	2.251	-0.627	-1.658	-10.17***	-4.186**	-3.324*
	(2.536)	(2.416)	(1.878)	(1.439)	(1.383)	(1.251)	(1.455)	(1.867)	(1.892)
lnincome		10.27*	8.162		7.994	9.219*		0.444	1.381
		(5.362)	(5.165)		(5.334)	(5.271)		(6.479)	(6.051)
lnincome squared		-1.216***	-0.978**		-1.002**	-1.037**		-0.267	-0.327
		(0.441)	(0.427)		(0.429)	(0.425)		(0.509)	(0.475)
lnavhhsize		2.283**	2.601**		2.385**	2.731***		2.173**	2.317**
		(1.054)	(1.027)		(1.049)	(1.021)		(1.071)	(1.036)
sharewomen		6.837***	4.677**		6.435***	4.294*		6.404**	3.778*
		(2.590)	(2.339)		(2.416)	(2.212)		(2.548)	(2.271)
shareold		59.43***	45.70***		60.61***	46.36***		54.30***	45.48***
		(9.698)	(9.559)		(9.626)	(9.428)		(10.19)	(9.458)
shareurban		0.133	0.337		0.171	0.361		0.0869	0.396
		(0.548)	(0.466)		(0.552)	(0.463)		(0.547)	(0.460)
constant	2.706***	-21.69	-17.08	2.706***	-15.88	-21.46	2.706***	2.835	0.534
	(0.0375)	(16.06)	(15.37)	(0.0374)	(16.35)	(16.03)	(0.0353)	(20.48)	(19.32)
year fixed effects	y	y	y	y	y	y	y	y	y
geografical controls	n	n	y	n	n	y	n	n	y
observations	3,184	3,184	3,184	3,184	3,184	3,184	3,184	3,184	3,184
R-squared	0.757	0.794	0.814	0.758	0.793	0.815	0.778	0.794	0.815
number of counties	398	398	398	398	398	398	398	398	398

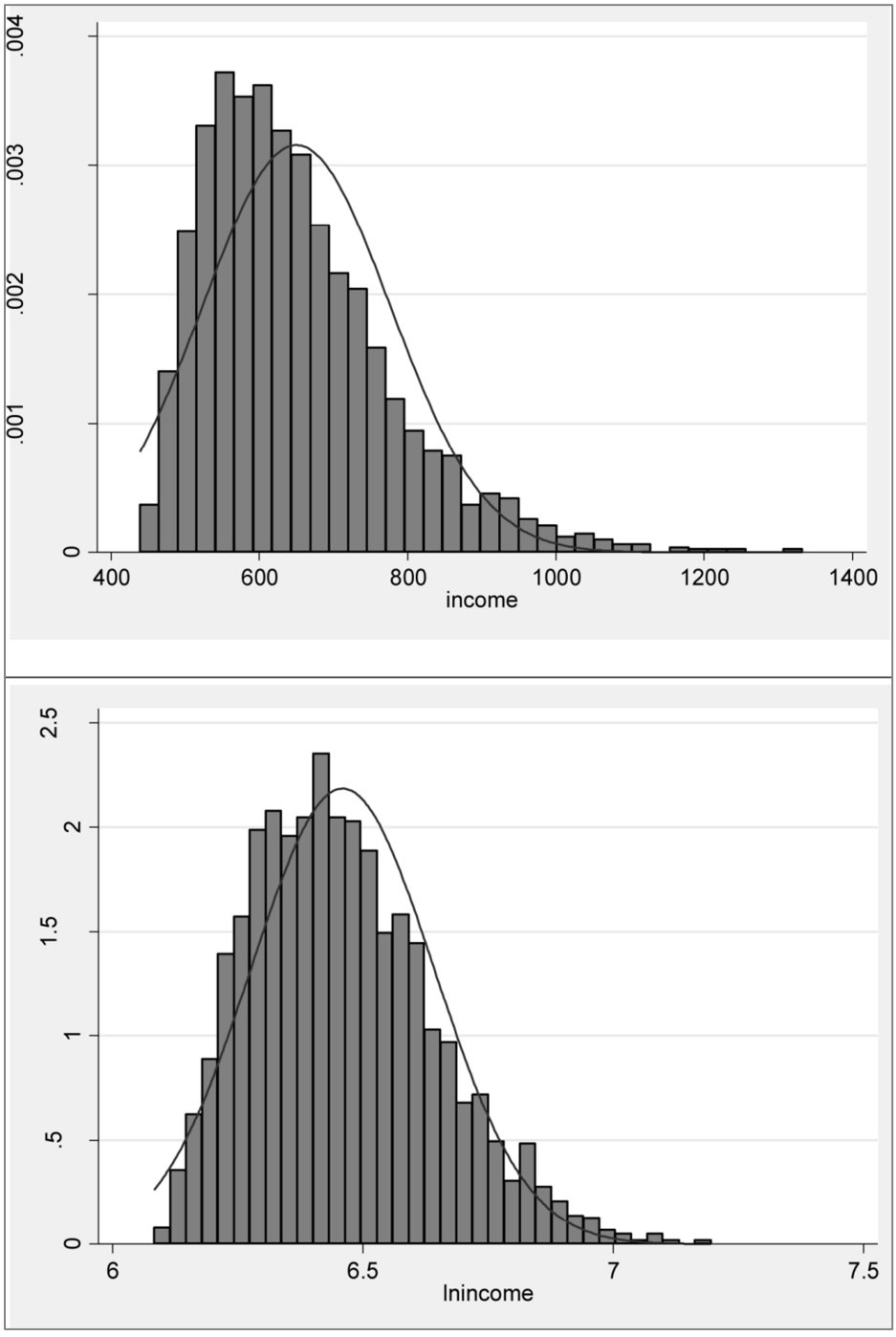
Clustered standard errors in parentheses, clustered at the level of counties *** p<0.01, ** p<0.05, * p<0.1

Table A4: The Magnitude of the Crowding-out Effect

Year	Counterfactual savings p.c. minus estimated savings p.c. (D)	Average income	Average savings per capita	(D) in percent of average income	(D) in percent of savings p.c.
1874	0.0	594.6	41.3	0.0	0.0
1875	-0.6	610.0	46.4	-0.1	-1.3
1882	10.1	565.5	70.4	1.8	14.4
1888	13.7	593.1	101.5	2.3	13.5
1897	56.9	663.7	153.9	8.6	37.0
1898	68.5	683.6	163.1	10.0	42.0
1903	100.1	738.8	203.6	13.6	49.2
1904	117.6	752.5	218.1	15.6	53.9

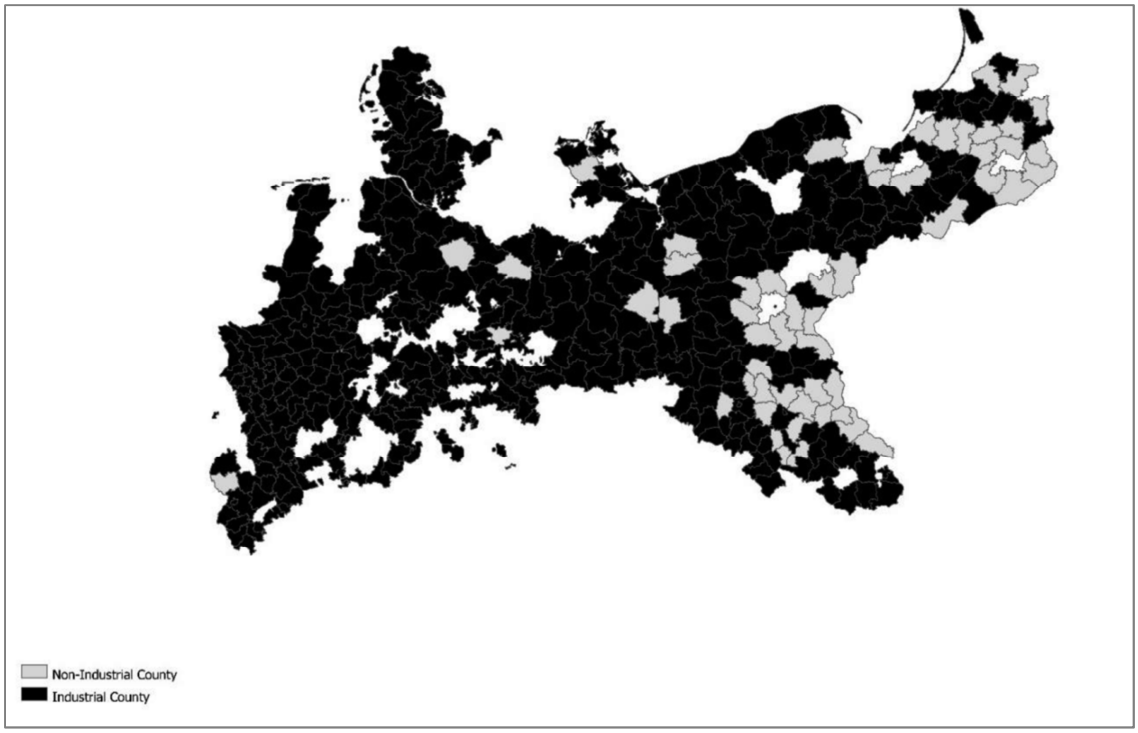
Source: Own calculations.

Figure A1: Histogram of the Income Distribution



Source: Own calculations.

Figure A2: Industrial Counties (Share of Agricultural Workers is less than 20%)



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