Elites and health infrastructure improvements in industrializing regimes

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Abstract

We examine the political economy factors behind rising public health infrastructure investments in industrializing regimes. To this end, we compile information on more than 5,000 Prussian politicians, digitize administrative data on the provision of health-promoting public goods, and gather local-level information on workers' movements. Results from OLS and 2SLS regressions suggest that increased investments can be explained with elites' self-interests and their fear of social turmoil. In particular, we find that measures preventing the outbreak and spread of diseases serve the personal interests of the elites, while the access to health care services was improved to avoid instabilities.

Key words: biographical data, distribution of power, health, elites, mortality, Prussian history, public goods, redistribution, workers' movements

JEL classifications: H11, H42, H75, I15, N33, O43, P16

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1 Introduction

The role of elites in the process of development is the topic of various studies in economics, history, and political science (Amsden et al., 2012). In the current debate, a key question is why elites implement reforms that benefit the poor people, for example by extending their political rights or by improving their human capital. Broadly speaking, there are two basic theories regarding this question. The first theory implies that elites accept redistribution policies and political reforms to prevent social turmoil and revolutions (see e.g. Acemoglu and Robinson, 2000, 2001). The second theory suggests that reforms serve the interests of the elites and that they thus voluntarily support them (see e.g. Galor and Moav, 2006, Lizzeri and Persico, 2004).

During the last years, proponents of either of the two theories provided qualitative and quantitative evidence in order to substantiate their theory or to invalidate the other.[1] The purpose of our paper is different. Instead of arguing in favor of one particular theory, we present regression results, suggesting that the two theories jointly explain why public expenditures on health increased massively in most Western countries during the 19th and early-20th century.

Conceptually, we start from the observation that health-promoting policy projects differ in the way of how they affect people's health. On the one hand, there are projects (such as the opening of a public hospital or the introduction of a public health insurance) that improve people's access to medical care. On the other hand, public funds can be used to realize projects that prevent the outbreak and spread of diseases. Examples for the latter type of projects are the opening of a slaughter house and the construction of a sewage system. In this paper, we argue that elites in industrializing regimes greatly benefit from the second type of projects and thus support their realization. By contrast, the personal benefits from the first type of projects are rather small for the members of the elite. We therefore argue that measures due to which poor people receive access to medical services have the purpose of decreasing the risk of social turmoil and political instability.[2]

[1] See e.g. Aidt et al. (2010), Aidt and Jensen (2014), Aidt and Franck (2015, 2019), Ashraf et al. (2020), Baten and Hippe (2018), Boix (2003), Cinnirella and Hornung (2016), Cvrcek and Zajicek (2019), Goni (2018), Mares and Queralt (2015, 2020), Nafziger (2011), Vollrath (2013), Ramcharan (2010), and Ziblatt (2008).

[2] A prime example in this regard is the introduction of the public health insurance in Germany by Chancellor Otto von Bismarck in 1884 (Bauernschuster et al., 2020).

We use newly digitized data from late-19th/early-20th century Prussia to support our arguments. From our perspective, Prussia is an excellent case for four main reasons. First, Prussia was the leading country with regard to the realization of health infrastructure projects at the beginning of the 20th century (Brown, 1989). Second, local governments were responsible for these infrastructure investments (Vögele, 2001). Third, the Prussian electoral laws ensured that local policy decisions were made by the elite (Dawson, 2019, Krabbe, 1989). Finally, local variation exists in how much influence landowning and landless elites had on policy choices.[3] For addressing our research question, this variation is helpful since landless elites have greater benefits from measures that prevent the outbreak and spread of infectious diseases than landowning elites. Put differently, if self-interest plays a role, we should observe that the landless elite in Prussia was more active in implementing preventive policies than the landowning elite. With regard to measures that facilitate access to health care for the poor, we argue that the landowning and landless elite do not differ in their personal benefits. However, when elites accept redistribution in order to decrease the risk of strikes and social turmoil, we should nevertheless find that landless elites implement more health care measures because the workers' movements in Prussia were much less organized in the agricultural sector than in the non-agricultural sectors.

To measure how the local political power was distributed between the landowning and the landless elite in late-19th/early-20th century Prussia, we compile biographical information on more than 5,000 politicians. More specifically, we identify for each member of the German parliament, each member of the Prussia parliament, and each county director whether he or one of his close relatives owned land. Based on this information, we build time-variant and time-invariant county-level measures on the distribution of power. Furthermore, we digitize local-level infrastructure data published by the Royal Prussian Statistical Office. With regard to our study, the most remarkable features of this data are that it provides information on eight different health-promoting public goods and that these public goods affect

[3]Our differentiation of elites is consistent with various political economy models that distinguish two types of elites (see e.g. Galor et al., 2009). The term "landless" elite bundles together wealthy citizens that are not engaged in the agricultural sector (i.e. firm owners, lawyers, professors, merchants, master craftsmen, judges, teachers, etc.). We use the terms "landless" and "landowning" elite instead of "urban" and "rural" elite because the place of living is a rather imprecise proxy for the source of wealth in our setting.

people's health in different ways.[4] While three of them improve the access to medical care, the others prevent the outbreak and spread of infectious diseases.

We begin our empirical analysis with a cross-sectional OLS regression. The results of this regression suggest a positive and statistically significant correlation between the local political power of the landless elite and the provision of health-promoting public goods. A series of robustness checks, including a panel data analysis, confirms this positive association. In line with our hypotheses, we also observe that the positive correlation holds if we distinguish between public goods that decrease the likelihood of disease outbreaks and public goods that facilitate access to medical services. To establish causality, we use two-stage least square approaches that exploits natural variation in soil quality (for similar approaches, see e.g. Cinnirella and Hornung, 2016, Easterly, 2007, Goni, 2018). Our second-stage estimates confirm that Prussia's landless elite invested more in health infrastructure than its landowning elite. Common first-stage diagnostics indicate that a weak-instrument bias is unlikely. We also provide evidence, suggesting that our 2SLS estimates are quite unlikely to be driven by a violation of the exclusion restriction.

To study the reasons for why landless and landowning elites differed in their support for health-promoting public goods, we perform heterogeneity analyses that test whether the strength of the workers' movements is a moderating factor. To measure how well the workers were organized, we exploit information on the electoral success of the Social Democratic Party (SPD) and newly digitized local-level data on trade union membership and strikes. We find that landless elites implemented more preventive policies than landowning elites, regardless of whether the working class people were well organized or not. This result implies that self-interest was a driver of reforms. By contrast, for measures that facilitate access to health care services, we only see differences between the landless and the landowning elite when workers' movements were strong. We conclude from this finding that an increased risk of social turmoil motivates elites to accept health-promoting redistribution policies.

This paper is structured as follows. Section 2 summarizes the related literature and establishes our hypotheses. Section 3 provides background

[4]Our list of health-promoting public goods includes: hospitals, sewage systems, water supply systems, waste collections, health funds, nursing facilities, baths, and slaughter houses.

information about late-19th/early-20th century Prussia. Section 4 describes our data. Section 5 presents our empirical methods and regression results. Section 6 concludes.

2 Literature and theoretical background

2.1 Related literature

In most Western countries, public spending on education and health grew notably during the Industrial Revolution (Lindert, 2004). From a political economy perspective, this development is interesting since it often started before voting rights were granted to broader segments of the population. Economic theory provides two different explanations for this rise in public expenditures. The first is based on the fact that workers became better organized in the 19th century and suggests that the elites therefore had to implement more redistribution policies to avoid social unrest (Acemoglu and Robinson, 2000, 2001, 2005, Piven and Cloward, 2012). The other popular explanation is that elites acted in their own interest since their benefits from investments in education and health increased during the process of industrialization (Galor and Moav, 2006, Galor et al., 2009, Lizzeri and Persico, 2004, Veselov and Yarkin, 2021).[5]

Supportive anecdotal and empirical evidence exist for either of the two theories. For example, the introduction of the compulsory health insurance in Imperial Germany is widely acknowledged as an reaction of Chancellor Otto von Bismarck to the increasing support for the new Socialist Workers Party of Germany (SAP) and the trade unions (Bauernschuster et al., 2020). Similarly, Aidt and Franck (2013, 2015, 2019) present results from early-19th century Britain, suggesting that protests influenced elites' voting and policy decisions. With regard to the second theory, Galor and Moav (2006) provide anecdotal evidence from several countries to substantiate the view that capitalist elites supported education reforms out of self-interest during the Industrial Revolution. Regression results by Baten and Hippe (2018), Galor et al. (2009), Goni (2018), Nafziger (2011), and Ramcharan (2010) are also in line with this theory. [6]

[5] Ashraf et al. (2020) suggest that elites' self-interests also played a significant role for the decline of coercive labor institutions during the Industrial Revolution.

[6] The empirical literature also includes a few studies whose results speak against the aforementioned theories. For instance, Dower et al. (2018) study the consequences of social unrest in mid-19th century Russia and do not find evidence for protest-induced increases

A notable difference between our paper and previous analyses is that we focus on health-promoting measures rather than on public spending on education. To the best of our knowledge, there is only very little evidence on the political economy factors, causing differences in health provision in industrializing countries. An exception in this regard is the work by Aidt et al. (2010), suggesting that urban elites supported the implementation of sanitary reforms in mid-19th century England and Wales.

2.2 Theoretical background

The literature in economics lists a great variety of public measures that decrease mortality. Examples include: the introduction of a national health insurance (Bauernschuster et al., 2020), the construction of sewage and water supply systems (Alsan and Goldin, 2019, Beach et al., 2016, Kesztenbaum and Rosenthal, 2017), the implementation of vaccination policies (Ager et al., 2018, Bleakley, 2007), and the opening of a hospital (Buchmueller et al., 2006). For our analysis, a very crucial aspect in this regard is that these measures differ in the way of how they affect health. While some of them prevent the outbreak and spread of diseases, others facilitate the access to health care services and thereby help sick people to recover. Below, we consider these two types of measures independently from each other.

2.2.1 Preventive measures

Related studies mainly provide two arguments for why the elites of an industrializing country might have a personal incentive to support policies that prevent the outbreak and spread of diseases. First, Lizzeri and Persico (2004) suggest that elites face a non-negligible infection risk if a disease breaks out among poor people because rich and poor individuals do not live completely separated from each other. Put differently, by supporting measures that prevent disease outbreaks among the poor, the members of the elite can increase their own life expectancy (see also Troesken, 2002).[7]

in public spending on education. Cinnirella and Hornung (2016) suggest that demand factors rather than the different interests of Prussia's landowning and capitalist elites explain local differences in enrollment rates. Andersson and Berger (2019) show that the landowning rather than capitalist elites supported the expansion of mass schooling in 19th century Sweden.

[7]To support their argument that elites of industrializing regimes fear such externalities, Lizzeri and Persico (2004) quote a British parliamentary report from 1844 stating that: "*the presence of such emanations, whether they be derived from stagnant ditches, open cesspools, or from accumulation of decaying refuse, is a great cause of disease and death, no confined to the immediate district in which they occur, but extending their influence*

Second, Brown (1989) argues that elites implement preventive measures to avoid income losses. More specifically, Brown's argument is that elites are concerned that infectious diseases spread among their workers and thereby cause costly production stoppages or delivery delays.

In industrializing countries, there are typically landowning and landless elites (Galor et al., 2009, Llavador and Oxoby, 2005). For three reasons, we argue that landless elites have more personal benefits from implementing preventive measures than landowning elites. First, landowning elites often live more separated from the poor and thus face a lower risk of getting infected by a disease that breaks out among lower class people. Second, the share of workers that will be (simultaneously) affected, if an infectious disease breaks out, is likely to be higher in the non-agricultural than in the agricultural sector since work spaces are more densely populated and propagation speeds therefore higher. Finally, the importance of high-skilled workers is larger in the non-agricultural sectors and replacing them, when they get sick, is much more difficult than replacing low-skilled workers.

2.2.2 Access to health care services

There are basically two types of public measures in industrializing regimes that increase the accessibility of medical services. The first measure is to expand the capacities of public hospitals and nursing facilities. The second measure is to decrease the costs for medical treatment by implementing a public health insurance system or a local provident fund. For different reasons, we think that these measures create no personal benefits for the members of the elite. For example, due to the rather low quality of public hospitals in industrializing regimes, elites often receive their treatments at home or in private hospitals. Furthermore, when visiting a public hospital, wealthy people largely increase their risk of becoming infected by diseases that usually spread among the poor people (Labisch and Spree, 2001, Vögele, 2001). Finally, elites do not need public support for accessing health care services.

Although neither landowning nor landless elites had substantial personal benefits from implementing measures that facilitate access to medical care, we expect the landless elites to be more active in this regard than the landowning elites. Our hunch is based on the argument that the costs of coordination are much larger for the workers' movements in the agricultural

to neighborhoods, and even to distant places" (see 2nd Report of the Parliamentary Commission of Inquiry into the State of Large Towns and Populous Districts, 1844).

sector than for the workers' movements in the other sectors. The landless elites therefore face a higher risk of strikes and social turmoil, and thus implement more redistribution policies.

2.2.3 Summary

In sum, if our theoretical arguments hold, we should find evidence for the following hypotheses:

1. The extent to which health-promoting public policies are implemented in industrializing countries increases in the political influence of the landless elite.

2. Landless elites are more active in improving people's access to health care services, but only if the poor are organized enough to threaten the landless elite with strikes and social turmoil.

3. Landless elites implement more policies that prevent the outbreak and spread of diseases, even when they are not threatened by the working class.

3 Historical background

We will exploit data from late-19th/early-20th century Prussia to test the hypotheses developed in the previous section. In what follows, we briefly describe why Prussia provides an institutional setting that is particularly well-suited for this purpose. In Appendix A, we offer further information, especially on the administrative structure of Prussia as well as the voting procedures that were applied at the different layers of government.

Provision of health-promoting public goods

As in most other western countries, the demand for health infrastructure investments grew notably in Prussia during the 19th-century due to the Industrial Revolution. Meeting this challenge was primarily a responsibility of the local authorities because the municipal councils in Prussia decided alone in which infrastructure projects they invest in and also on how to finance these investments (see Dawson, 2019, Krabbe, 1985, Vögele, 2001). A consequence of this great fiscal autonomy was substantial variation in the provision of health-promoting public goods.

In the late-19th/early-20th century, Prussian municipalities already had a variety of health-related amenities. The most common amenities were water supply and sewage systems, hospitals, public baths, and slaughter houses (Krabbe, 1985). Especially remarkable in this respect is that most of these amenities were municipalized (Dawson, 2019).[8] For example, in the beginning of the 20th century, 94 percent of the water companies were in municipal ownership (Krabbe, 1985). For hospitals, this share was somewhat smaller because of the non-negligible number of church-owned hospitals (Guttstadt, 1900). However, many counties and municipalities subsidized these church-owned hospitals (Vögele, 2001). Vögele (2001) also suggests that both the municipal- and the church-owned hospitals were primarily visited by poor people.

At the turn of the 20th century, Prussia was a leading country with regard to the provision of health-promoting public goods (Dawson, 2019). This pioneer role is especially notable because the per-capita income in Prussia was much lower than in England or the United States (Brown, 1989). Prussia reached this leading position due to massive infrastructure investments in the late 19th century. For instance, the number of hospitals in Prussia increased from 1626 in 1876 to 3892 in 1900 (Guttstadt, 1900). Similarly, Grahn (1898) and Salomon (1907) report large increases in the number of water supply and sewage systems. A consequence of all these health infrastructure investments was a declining mortality rate (see Brown, 1989, Gallardo-Albarrán, 2020, Gehrmann, 2011).[9]

Political system

Prussia was a semi-constitutional monarchy where the right to vote was restricted to men and where the electoral laws ensured that virtually all policy decisions were made by the wealthy rather than the poor people (Dawson, 2019, Hofmann, 1964, Krabbe, 1989). At the local level, the poor had hardly any political influence for two main reason. The first is the suffrage which had only been granted to a citizen if he owned a dwelling house, paid a sufficient amount of income tax, or carried out a business.

[8] A higher degree of communalization also existed in England, Italy, and Switzerland. According to Dawson (2019), Prussia used the principle of municipalization to economic undertakings more extensively than any other country.

[9] Improved health infrastructure is not the only reason for why mortality declined in late-19th/early-20th century Prussia. Other important reasons are the introduction of Bismarck's health insurance (Bauernschuster et al., 2020) and medical innovations such as the discovery of the diphtheria antitoxin (Vögele, 2001).

Furthermore, citizens lost their right to vote if they received any kind of pauper relief, went bankrupt, or delayed their tax payments (Dawson, 2019). The consequence of these rules was that only relatively few people were eligible to vote or to become a member of a local council. For example, Krabbe (1985) reports that only 2,743 of the more than 45,000 inhabitants of the city of Dortmund had the right to participate in the municipal election in 1873.

The second main reason for why municipal councils were dominated by wealthy citizens is the voting system, known as *Three-Class Franchise System*. A key feature of this voting system is that it translates tax payments into voting power (Becker and Hornung, 2020, Dawson, 2019, Kühne, 1994a, Krabbe, 1989). More specifically, prior to the election, the eligible voters were first ranked based on their tax amounts and then divided into three groups such that the sum of all tax payments did not vary across these three groups. Typically, the first group only included a few voters, whereas the bulk of the electorate belonged to the third group (Hofmann, 1964). In various cases, the first group only consisted of one voter. For instance, in the city of Essen, the famous steel manufacturer and inventor Alfred Krupp was the only first-class voter from 1886 to 1894 (Krabbe, 1989). The unequal group sizes are remarkable because each of the three groups selected one third of the municipal councilors. Put differently, the few voters in the first group were as influential as all the voters in the third group. In the city of Essen, Alfred Krupp thus chose the same number of councilors in 1891 as the 393 voters in the second group and the 3650 voters in the third group (Krabbe, 1989). A consequence of this unequal distribution of influence was that the representatives of the poor hardly became members of the local councils. For example, in the cities of Dortmund and Münster, the working class was not represented in the city councils until the 1890s. Between 1900 and 1914, the share of councilors that belonged to the working class was smaller than 10 percent in both cities (Krabbe, 1985).

The electoral laws privileged the wealthy elite not only at the municipal level but also at other levels of government. For example, a variant of the Three-Class Franchise System was applied to decide on the members of the Prussian House of Representatives (Becker and Hornung, 2020, Kühne, 1994a). Furthermore, most influential political posts, such as county administrator (*Landrat*), mayor (*Bürgermeister*), or community leader (*Gemeindevorsteher*), required approval from the Prussian government (Wagner, 2005). Since the

Prussian government aimed to keep the working class out of the political system, a representative of the poor could hardly occupy a leading post even if he would be nominated by the responsible council. Appendix A.2 provides a more comprehensive description of the voting procedures that were applied at the different layers of government and explains in detail why they favored the wealthy people of the Prussian society.

Workers' movements

In late-19th/early-20th century Prussia, the interests of the workers were mainly represented by the *Social Democratic Party of Germany* (SPD) and trade unions.[10] The SPD was founded in 1875 as a result of a merger between the *General German Workers' Association* (ADAV) and the *Social Democratic Workers' Party of Germany* (SDAP) which had been established in 1863 and 1869, respectively (Guttsman, 2019, Roth, 1979).[11] In its first years, the development of the SPD was massively impeded by a series of laws, known as the *Socialist Laws* (Lidtke, 1966). These laws were in place between 1878 and 1890 and outlawed all activities and newspapers that spread social-democratic principles. From 1890 onward, the support for the SPD increased steadily. In 1914, the SPD had approx. 1 million members and was (by far) the largest political party in Germany. However, due to the electoral laws in Prussia, the SPD had only rather little influence in municipal parliaments. A common way of how the SPD tried to influence local policy making in Prussia was thus to put pressure on the elites by organizing protest events (Steinmetz, 1990).

The first nationwide trade unions in Germany were established by cigar workers and book printers in 1865 and 1866, respectively. Their primary goal was to improve the working and living conditions of their members. As the SPD, trade unions suffered heavily from the Socialist Laws since these laws prohibited all union activity. In particular, the Socialist Laws were the main reason for why no umbrella organization existed until the establishment of the *General Commission of German Trade Unions* in 1890. From 1893 onward, the German trade unions also steadily increased their cooperation at the municipal level, especially by forming local associations,

[10] At that time, the SPD as well as the trade unions were primarily movements for non-agricultural workers rather than for agricultural workers. It is thus plausible to assume that the landless elites in Prussia faced a higher risk of strikes and social turmoil than the landowning elites.

[11] The SPD was initially named Socialist Workers Party of Germany (SAP) and was renamed in 1890.

called *union cartels* ('*Gewerkschaftskartelle*'). In 1913, such associations had been established in about 750 German places with a total of 2.3 million members. To achieve their goals, the trade unions used various measures, such as going on strikes, launching labor disputes, and calling for boycotts. (Schroeder, 2013, Tennstedt, 1983).

4 Main variables

4.1 The distribution of political power

The conventional procedure for measuring how much political influence a specific social group has is to compute the share of political posts being occupied by the members of this group (see e.g. Clots-Figueras, 2011, 2012, Hyytinen et al., 2018).[12] The ideal measure for the local political power of the landless elite in a non-democratic regime is thus:

$$U \;=\; \frac{1}{n}\sum_{j=1}^{n}(1 \;-\; p_j) \;\;\in\; [0,\,1] \tag{1}$$

where $n > 0$ denotes the number of local politicians and p_j a dummy variable that is equal to 0 (1) if a politician $j \in \{1, \ldots, n\}$ belongs to the landless (landowning) elite. The political influence of the landowning elite is then:

$$A \;=\; 1 \;-\; U \;\;\in\; [0,\,1]. \tag{2}$$

In practice, computing A and U is difficult for various reasons. A key problem is that creating a list of all municipal councilors is impossible because of limited data availability. As an alternative, we exploit data on politicians that represented the municipalities in superordinate bodies. To this end, we first check for which types of political posts a full list of incumbents exist. Extensive searches in dictionaries yield that this is the case for (i) the county directors,[13] (ii) the members of the Prussian House

[12] Clots-Figueras (2011, 2012) uses the share of female parliamentarians to measure the political power of women. Hyytinen et al. (2018) measure the influence of the public employees with the share of local parliamentarians that work in the public sector. Implicitly, the assumption that the political power of a social group increases in the number of parliamentary seats is also made by all studies that apply a Regression Discontinuity Design to test whether political selection affects policy outcomes (see e.g. Pettersson-Lidbom, 2008).

[13] The Prussian administrative system distinguished between counties (*Landkreise*) and county boroughs (*Stadtkreise*). The former were governed by a county administrator (*Landrat*), whereas the Lord Mayor of the eponymous town served as the head of a

Table 1 Documentation of the data collection process (excerpt).

Name	Landed elite	References	Note
		⋮	
Becker, Hermann	0	Mann (1988), Romeyk (1994)	He was a merchant before he became a politician. Father was a physician, father-in-law was a merchant.
Becker, Leo	1	Best and Schröder (1992)	Owner of a manor.
Becker, Wilhelm (von)	1	Romeyk (1994)	Father was a pastor. Father-in-law was a business man and owned a manor. Received noble title in 1911.
Beckerath, Gustav Adolf von	0	Romeyk (1994)	Father and father-in-law were factory owners.
		⋮	

Notes: This table illustrates based on four examples how we document our data collection process. The final documentation file consists of more than 300 pages and is available upon request.

of Representatives, and (iii) the members of the parliament of the German Empire (*Reichstag*).[14] In total, our three lists include 5,144 politicians (for details, see Table D.2). All of them were male and served between 1867 and 1914.

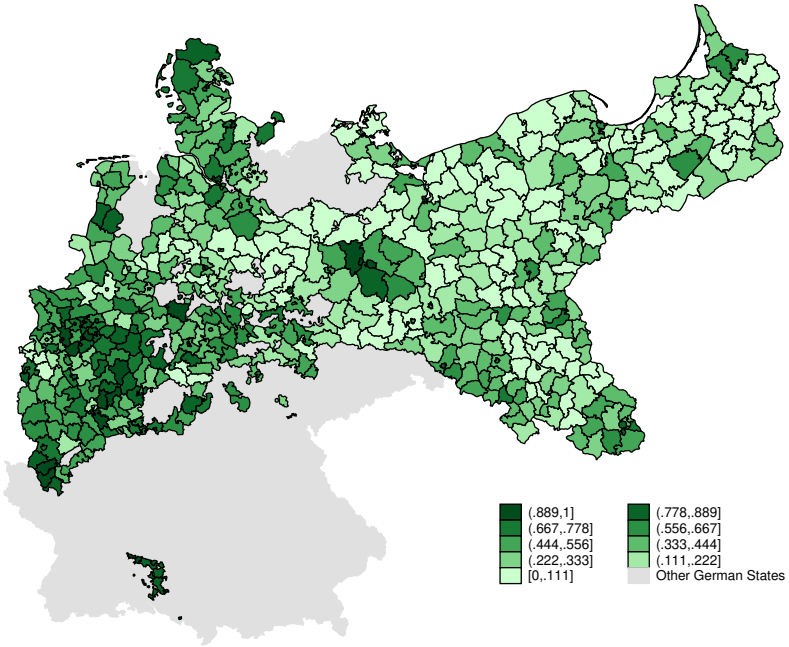
The main conceptual challenge when building measures for the political power of the landowning and landless elite in Prussia is to establish the criteria based on which we can classify the politicians. Our guide in this regard is the literature on political selection (for reviews, see Besley, 2005, and Dal Bó and Finan, 2018). In particular, we will take over the idea of using personal characteristics as the basis of classification. A politician will thus be labeled as a member of the landed elite ($p_j = 1$) if he owned arable land or belonged to a family that owned land (for more details, see Appendix B).

Determining whether a particular Prussian politician owned land or had landowning relatives is difficult since no centralized source of information exists. Put differently, we have to run a separate information search for each of the 5,144 politicians in our database. More specifically, we first verify whether a politician has an entry in (i) Wikipedia, (ii) the online databases on important persons published by the states of Hesse, North

county borough. We use the term "county director" to simultaneously refer to both of these posts.

[14] Best and Schröder (1992) list the members of the *Reichstag*. Kühne (1994b) and Mann (1988) itemize the members of the Prussian House of Representatives. To identify the heads of the counties and county boroughs, we use various handbooks (Gey, 1976, Hauf, 1980, Hubatsch et al., 1975, Klein, 1988, Romeyk, 1994, Stüttgen, 1980, Wagner, 1982, Wegmann, 1969), Wikipedia, and the online database of Jehnke (2013).

Figure 1 Political power of the landless elite in Prussian counties (1890 – 1910).



Notes: This figure presents a map of the German Empire in the borders of 1890. The shade of green indicates how powerful the landless elite was between 1890 and 1910. A dark (light) shed of green suggests that the landless (landowning) elite enjoyed great political influence.

Rhine-Westphalia, Rhineland-Palatinate, Saarland, and Saxony, or (iii) the biographical handbooks published by Angerbauer (1996), Best and Schröder (1992), Dvorak (1996, 1999a,b, 2000, 2002, 2005, 2013, 2014), Gey (1976), Hansen and Tennstedt (2010), Hauf (1980), Haunfelder (1994), Herlemann and Schatz (1996), Klein (1988), Kühne (1994b), Mann (1988), Romeyk (1994), Wagner (1982), and Wegmann (1969). For the members of a noble family, we also browsed through various issues of the *Gothaisches Genealogisches Taschenbuch*.[15] If none of our primary sources provided helpful information, we carried out a comprehensive online search. At the end of our search, we use the available information to classify each politician (for example cases, see Appendix B.2). For the sake of transparency, we develop a document that lists our references and provides short explanations for all decisions. Table 1 presents an excerpt of this document.

For 4 out of 2657 members of the Prussian House of Representatives (0.1%) and 144 out of 2031 county directors (7.1%), we do not find any usable biographical information. In our main analysis, we label them as representatives of the landowning elite. We proceed in this way since we expect that the provision of health-promoting public goods improves if

[15]The *Gothaisches Genealogisches Taschenbuch* is regularly updated encyclopedia that includes detailed information about noble families.

the political influence of the landowning elite decreases. Confirming this hypothesis is most challenging if we classify all politicians for which no biographical information exist as members of the landowning elite.

To finally obtain a county-level measure for the local political power of the landless elite, we use an aggregation procedure that consists of four steps.[16] In the first step, we compute the fraction of time in which the director of a county (i) was a representative of the landless elite:

$$U_{i,t}^{Admin} \;=\; \frac{1}{\tau_2 \;-\; \tau_1 \;+\; 1} \cdot \sum_{k=\tau_1}^{\tau_2} (1 \;-\; p_{i,k}^{Admin}) \tag{3}$$

where τ_1 (τ_2) denotes the start (end) year of period t and $p^{Admin} \in \{0, 1\}$ whether the county director owned land or had a landowning relative. In the second and third step, we produce equivalent sub-indicators for the members of the Prussian House of Representative and the members of the *Reichstag*:

$$U_{i,t}^{MP_P} \;=\; \frac{1}{\tau_2 \;-\; \tau_1 \;+\; 1} \cdot \sum_{k=\tau_1}^{\tau_2} \left(\frac{1}{\lambda_{i,k}} \cdot \sum_{j=1}^{\lambda_{i,k}} (1 \;-\; p_{i,j,k}^{MP_{Prussia}}) \right) \tag{4}$$

$$U_{i,t}^{MP_R} \;=\; \frac{1}{\tau_2 \;-\; \tau_1 \;+\; 1} \cdot \sum_{k=\tau_1}^{\tau_2} \left(\frac{1}{\sigma_{i,k}} \cdot \sum_{j=1}^{\lambda_{i,k}} (1 \;-\; p_{i,j,k}^{MP_{Reich}}) \right) \tag{5}$$

where λ (σ) denotes the number of politicians that represent the county in the Prussian (German) parliament and p^{MP_P} (p^{MP_R}) $\in \{0, 1\}$ whether a particular politician belonged to the landed elite.[17] In the last step, we aggregate our three sub-indicators, using an additive aggregation rule.[18] Our final proxies for the local political power of the landowning and landless elite are thus:

$$U_{i,t} \;=\; \frac{1}{3} \cdot \left(U_{i,t}^{Admin} \;+\; U_{i,t}^{MP_P} \;+\; U_{i,t}^{MP_R}\right) \quad \text{and} \quad A_{i,t} \;=\; 1 \;-\; U_{i,t}. \tag{6}$$

Figure 1 shows for each Prussian county how powerful the landless elite was in the late-19th/early-20th century. We see great heterogeneity both

[16] For an example, see Table D.4.

[17] Note that some electoral districts included more than one county. The parliamentarians that represented these electoral districts thus play a role for multiple counties.

[18] We use an additive aggregation rule in our basic version because we believe that our three sub-indices constitute partial substitutes. In Section 5.4, we will show that our empirical results do not significantly change when we apply an alternative aggregation method. For an overview about the strengths and weaknesses of specific aggregation techniques, see Gründler and Krieger (2016, 2019, 2021).

across and within the Prussian provinces. In particular, our data suggests that the landless elite was least influential in the provinces of *East Prussia* and *Pomerania* and most powerful in the provinces of *Westphalia*, *Hesse-Nassau*, and *Rhineland*. This result fits well together with the assessments of many historians (see e.g. Gerschenkron, 1943, Kühne, 1994a, Wagner, 2005, Wehler, 1987).

An objection regarding our procedure for measuring the distribution of political power might be that the politicians for which we compiled data were not directly responsible for the decisions on the provision of health-promoting public goods. Put differently, there might be the concern that Prussian elites supported another type of politician at the municipal level than at the county, state, or national level. In particular, our estimation results would be completely misleading if the landless (landowning) elites would have favored landowning (landless) politicians in municipal elections and landless (landowning) politicians in other elections. For a couple of reasons, we believe that such a distortion is very unlikely. For instance, the available lists of municipal parliaments do not suggest that the elites behaved differently in municipal elections (see e.g. Hofmann, 1964, Krabbe, 1985). Furthermore, during the data collection process, we observed that many state and national politicians had served as a municipal councilor before entering the Prussian or German parliament. Finally, rich anecdotal evidence exist, suggesting that many Prussian parliamentarians had great political influence at the local level (see e.g. Kühne, 1994a).

4.2 The provision of health-promoting public goods

In Section 2, we outlined that health-promoting public policies differ in the way of how they improve peoples' health. More specifically, we argued that some policy interventions prevent the outbreak and the spread of diseases, whereas others facilitate the access to medical care and thus increase the chance of healing. For the purpose of our paper, this distinction of health-promoting measures is crucial because we expect notable differences in the reasons for why elites implement these measures. Consequently, to test the hypotheses developed in Section 2.2, we require very detailed data on the implementation of health-promoting measures. We address this problem by digitizing publications of the Royal Prussian Statistical Office (see Tetzlaff, 1911, 1914). For answering our research question, we believe that there is no better data source because Tetzlaff's reports include local-level data on

Table 2 List of health-related public amenities in our data set.

Public good	Type
Hospitals	Access
Nursing facilities	Access
Public health funds	Access
Sewage systems	Prevention
Water supply systems	Prevention
Waste collection	Prevention
Public baths	Prevention
Slaughter houses	Prevention

the provision of eight different health-related public goods. Three of these public goods give poor people access to health care services. The others prevent the outbreak and the spread of infectious diseases (for details, see Table 2).

Table D.3 illustrates based on two examples how we obtain county-level measures, reflecting the provision of health-promoting public goods. For each county, we first compute the total number of municipalities. The raw data comes from Galloway (2007).[19] We then extract from Tetlaff's reports how many municipalities provided a particular health-promoting public good in 1911 and calculate a coverage rate for each health-related amenity (g) and each county (i):

$$h^g_{i,1911} \;=\; \frac{1}{e_i} \cdot \sum_{j=1}^{e_i} D^g_{j,1911} \tag{7}$$

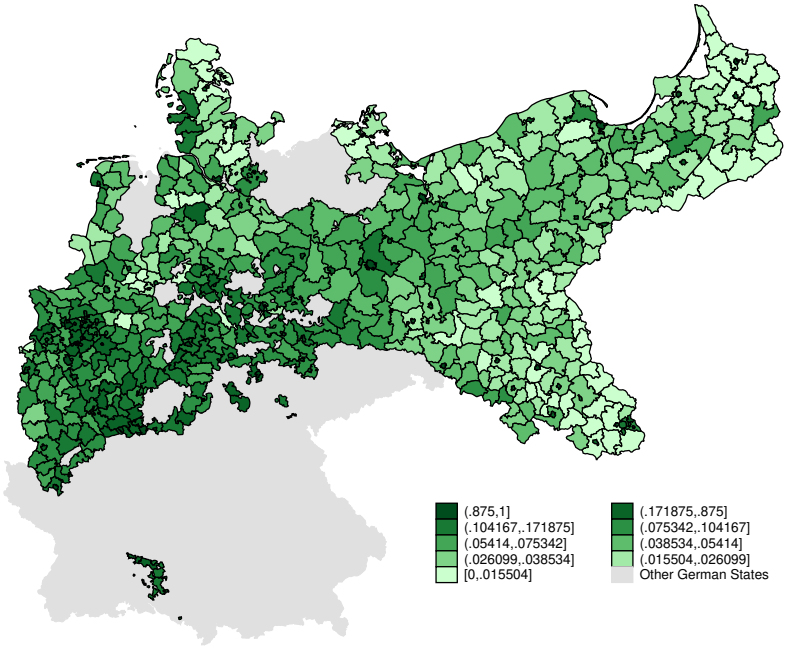
where e is the total number of municipalities and D a dummy that is equal to 1 if a municipality provided the health-promoting public good in 1911, and 0 otherwise. Our main measure of public good provision is the mean of the eight individual coverage rates:

$$H_{i,1911} \;=\; \frac{1}{8} \cdot \sum_{g=1}^{8} h^g_{i,1911}. \tag{8}$$

To investigate the provision of different types of health-promoting public goods, we separately compute means for the public goods that ease the access to medical care and those that prevent the outbreak of infectious diseases.

[19] As explained in Appendix A, there were three different types of municipalities: towns, rural communities, and estates. Galloway (2007) reports county-level figures on the total number of municipalities only for every fifth year. For creating our measure, we thus use the figures of 1910.

Figure 2 Provision of health-promoting public goods in Prussian counties in 1911.



Notes: This figure presents a map of the German Empire in the borders of 1911. The shade of green reflects the extent of public good provision. The darker the shade of green, the more health-promoting public goods were provided.

Figure 2 shows the extent to which health-promoting public goods were provided in 1911. We observe notable differences, especially between the eastern and western provinces and between the counties and the county boroughs. We also find that the level of public good provision was least pronounced in those provinces and districts where the landless elites were least powerful.

4.3 Strength of the working class

The third important ingredient that we require for testing the hypotheses developed in Section 2.2 is a measure that reflects the extent to which elites had to fear protest actions of the working class people. We build such a measure by combining three types of information. The first is the average vote share of the SPD in the federal elections between 1871 and 1911.[20] Our data source for this information is the database published by Galloway (2007). Second, we exploit data on trade union membership. More

[20]Federal elections in the German Empire took place in 1871, 1874, 1877, 1878, 1881, 1884, 1887, 1890, 1893, 1898, 1903, 1908, and 1912. We exclude the election in 1912 from our calculation since we have data on public good provision from 1911. We use the federal rather than the Prussian elections because the latter were often boycotted by the SPD.

specifically, we digitize a report published by the General Commission of German Trade Unions, listing the total number of members of each union cartel that existed in 1911.[21] We aggregate the membership figures to the county level and divide the aggregated figures by population to increase comparability. Third, we compile strike data for the period from 1899 to 1905 by digitizing reports of the Royal German Statistical Office.[22] As for our second measure, we aggregate the available information to the county level and express the number of strikes in per capita terms. Figures C.1 – C.3 show that the vote share of the SPD (W^{spd}), the number of trade union members (W^{tu}), and the number of strikes (W^{str}) are strongly and positively correlated.

We proceed in two steps to aggregate W^{spd}, W^{tu}, and W^{str}. First, we dichotomize each of the three measures. In particular, we set $\bar{W}^{spd}$ ($\bar{W}^{tu}$, $\bar{W}^{str}$) equal to 0/1 if W^{spd} (W^{tu}, W^{str}) is below/above the 75 percent quantile. Second, we sum up $\bar{W}^{spd}$, $\bar{W}^{tu}$, and $\bar{W}^{str}$ to obtain a graded index that shows how much pressure the workers' movements put on the elites:

$$W_i = \bar{W}_i^{spd} + \bar{W}_i^{tu} + \bar{W}_i^{str}. \tag{9}$$

5 Empirical analysis

5.1 Estimation strategies

5.1.1 Baseline approach

We begin our empirical analysis with a cross-sectional model in which the provision of health-related public goods (H) is a function of the political power of the landless elite (U) and a set of other variables ($\mathbf{X}$):

$$H_i = \zeta + \beta \cdot U_i + \gamma \cdot \mathbf{X}_i + \varepsilon_i. \tag{10}$$

Our parameter of key interest is β, showing how the provision of health-promoting public goods depends on the political influence of the landless elite increases. Put differently, a positive estimate of β suggests that the

[21] The figures have been published in the trade union magazine "*Correspondenzblatt der Generalkommission der Gewerkschaften Deutschland*" on 8 June 1912. A digital version of this issue is available here: http://library.fes.de/gewerkzs/correspondenzblatt/1912/pdf/1912-Statistische%20Beilage-005.pdf.

[22] In its series "Die Statistik des Deutschen Reiches", the Royal German Statistical Office provided information on strikes between 1899 and 1914. However, only until 1905, the data is published at the local level.

landless elites in late-19th/early-20th century Prussia invested more in the public health infrastructure than the landowning elites.

Results from estimating (10) need to be interpreted with great caution because the political influence of the landless elite (U) is not exogenously distributed across Prussia counties. More specifically, the OLS estimates of the parameter β are biased if the distribution of the political power and the provision of health-promoting public goods are jointly affected by an unobserved factor. To get an idea of how counties in which the landless elite is relatively powerful differ from counties that are dominated by the landowning elite, we present results of several balance tests in Table D.6. Not surprisingly, we observe notable differences. For instance, we observe that mortality rates were higher in those counties in 1871 in which the political power of the landless elite was high between 1871 and 1911. We also see that the landless elite was more influential in urbanized counties and that the distribution of political power correlates with the industry structure.

5.1.2 Instrumental variable approach

To reduce the risk that our OLS estimates will be biased due to omitted variables, we will add a large number of county-level control variables to our baseline model. We will also control for the huge cultural, economic, geographical, historical, and political differences between Prussia regions by including district fixed effects. Furthermore, we will show results from a two-stage least squares (2SLS) approach that exploits natural variation in soil texture to create plausibly exogenous variation in the political power of the landless elite (see e.g. Cinnirella and Hornung, 2016, Goni, 2018). Our first-stage regression model is:

$$U_i \;=\; \kappa \;+\; \alpha \cdot S_i \;+\; \delta \cdot \mathbf{X}_i \;+\; \eta_i. \tag{11}$$

where $S \in [0, 1]$ denotes the share of loamy soils (i.e. low quality soil). According to Cinnirella and Hornung (2016), this measure of soil texture is ideal for serving as an instrumental variable since it cannot be changed by humans.

We expect the first-stage parameter (α) to be negative and statistically significant due to the following logic. The profitability of small farms and consequently the demand for land increases in the quality of the soil. The wealthy landowners in late-19th/early-20th century Prussia therefore faced

less competition and had higher revenues if the soil quality was low. Due to the Prussian political system (for details, see Section 3), they also had more political influence in this case. Consistent with our expectation, we find a strong negative correlation between the share of loamy soils and the political power of the landless elite (see Figure C.4).

Our 2SLS approach produces unbiased estimates of β if our instrumental variable satisfies two conditions. The first condition requires that the share of loamy soils and the political power of the landless elite are strongly correlated. In our empirical analysis, we will report the results of the first-stage diagnostics proposed by Anderson and Rubin (1949) and Sanderson and Windmeijer (2016) to show that this first condition holds. The second condition is that the share of loamy soils affects the provision of health-promoting public goods only through its effect on the distribution of the local political power. We are aware that this crucial condition might be violated. For example, soil quality might affect crop choices, which in turn influences cultural traits and thus policy preferences (Ang, 2019, Luttmer and Singhal, 2011). Soil quality might also affect the demand for health-promoting public goods by influencing eating habits. To block these and other alternative channels, we will add a large number of control variables to our regression model.

5.1.3 Fixed effect approach

In most of our regressions, we will exploit variation across counties to investigate how the distribution of political power affects the provision of health-promoting public goods. A key problem of this approach is that we cannot control for all cultural, geographical, and historical confounders. To address this problem, we will present results from the following panel regression model:

$$M_{i,t} = \zeta + \beta \cdot U_{i,t-1} + \gamma \cdot \mathbf{X}_{i,t} + \theta_t + \xi_i + \varepsilon_{i,t} \tag{12}$$

where i denotes a county, t a five-year period, θ the period fixed effects, and ξ the county fixed effects. The latter control for all time-invariant factors and make sure that we exploit within-county rather than between-county variation in the political power of the landless elite. An objection against using (12) might be that its estimates can be biased because of unobserved time-varying county characteristics and errors in our measure of political power. To alleviate these concerns, we also run 2SLS regressions.

Following Galor et al. (2009), we use the interaction between a measure of soil quality and an index that reflects the nationwide price of agricultural crops as instrumental variable.[23] The econometric logic of our approach is that the interaction between an exogenous variable (share of loamy soils) and an endogenous variable (price index) is also exogenous (see Bun and Harrison, 2019). The economic intuition is that prices are correlated with revenues and, as a consequence of the Prussian political system, also with the distribution of the political power.

When estimating (12), we need to use the infant mortality rate (M) as dependent variable because time-varying data on the provision of health-promoting public goods is not available.[24] Compared with our baseline measure, using the infant mortality rate has pros and cons. An advantage is that mortality data does not only reflect differences in the number of health-promoting public goods but also differences in their quality. A key disadvantage is that infant mortality rates also depend on other factors. Without some additional evidence, it thus remains unclear to what extent the effect of a political factor on infant mortality can be explained with improvements in the public health infrastructure. Furthermore, when using the infant mortality rate, we cannot distinguish between different health-promoting measures. Since such a differentiation is necessary for verifying some of the hypotheses developed in Section 2.2, we will use the panel regression approach only for robustness checks (see Section 5.4.4).

5.2 Baseline results

Table 3 reports the results of six regressions. These regressions share three common features: First, they all exploit a sample that includes 17 county boroughs and 361 counties.[25] Second, all non-binary variables are

[23] Our index include the prices of four agricultural crops (wheat, rye, barley, flax). The raw data comes from Jacobs and Richter (1935).

[24] In the related literature, the infant mortality rate as frequently been used as a proxy for the provision of health-promoting public goods in developing countries (see e.g. Franck and Rainer, 2012).

[25] The number of Prussian counties and county boroughs increased notably between 1871 and 1914. For us, these increases create a small challenge since we have a measure of soil quality that matches the administrative borders of 1871 (see Meitzen, 1869, 1894) and information on the provision of health-promoting public good provision for 1911 (see Tetzlaff, 1914). To address this problem, we aggregate the latter to the borders of 1871 (for similar approaches, see e.g. Cinnirella and Streb, 2017, Lehmann-Hasemeyer and Streb, 2018). In 1871, Prussia consisted of 20 county boroughs and 402 counties. Our sample only consist of 17 county boroughs and 361 counties. Two reasons explain this reduction. First, Meitzen's data on the share of loamy soils does not exist for the district of *Wiesbaden* (*Hesse-Nassau*) and the province of *Hohenzollern*. Second, the

standardized such that they have a mean of zero and a standard deviation of one (for summary statistics, see Table D.5). Third, public good provision is always measured with a coverage rate that takes into account the availability of eight health-promoting public goods in 1911 (for a list, see Table 2).

Column 1 presents the OLS estimate of a regression model that consists of only two explanatory variables: a dummy variable that is equal to one for all county boroughs[26] and a measure that reflects how powerful the landless elite was between 1871 and 1911.[27] Our OLS estimate suggests a positive relationship between the political power of the landless elite and the provision of health-promoting public goods. In particular, we observe that a one standard deviation increase in the power of the landless elite is associated with a 0.16 standard deviations increase in the provision of health-promoting public goods.

The OLS estimate reported in Column 1 might be biased because of measurement error in our variable of interest, unobserved confounders, and reverse causality. In Column 2, we thus show the results from our 2SLS approach. We find that our 2SLS estimate ($\widehat{\beta}_{2SLS} = 0.25$) slightly exceeds our OLS estimate ($\widehat{\beta}_{OLS} = 0.16$).[28] Our first-stage diagnostics suggest that our second-stage estimate does not suffer from a weak-instrument bias (for the first-stage and the reduced-form estimate, see Table D.7).

In Column 3 and 4, we add a full set of district fixed effects to our regression model. These fixed effects control for all political, historical, demographical, cultural, geographical, and economical factors that vary at the district level. Given that the regional differences in late-19th/early-20th century Prussia were often substantial, we think that this model extension constitutes a demanding test for our baseline findings.[29] We observe that

county borders in the province of *Hanover* changed too drastically over time to apply a matching procedure.

[26] Our regression results indicate that county boroughs provide significantly more public good provision than counties. We do not present these results to save space. When excluding the county-borough-dummy from our regression model, the estimates of our variable of interest become larger and statistically more significant.

[27] We think that 1871 is a good starting point since the German Empire was founded in this year. 1911 is the year for which we have data on public good provision. In Section 5.4, we show that our results do not significantly change if we replace 1871 with another year.

[28] The difference that we observe between our OLS and 2SLS estimates are similar as in related studies (see e.g. Cinnirella and Hornung, 2016, Easterly, 2007, Ramcharan, 2010).

[29] Including district fixed effects is especially demanding for our 2SLS approach because they absorb a substantial share of the natural variation in soil quality. This also explains why strength of our instrumental variables decreases slightly.

Table 3 Political power of landless elite and the provision of health-promoting public goods (OLS and 2SLS).

	(1)	(2)	(3)	(4)	(5)	(6)
Power landless elite	0.161***	0.248***	0.094***	0.322**	0.082***	0.336***
	(0.0189)	(0.0541)	(0.0247)	(0.1400)	(0.0237)	(0.1228)
Approach	OLS	2SLS	OLS	2SLS	OLS	2SLS
SW F-Stat.	-	30.48	-	8.67	-	10.08
SY crit. value (15%/20%)	-	8.96/6.66	-	8.96/6.66	-	8.96/6.66
AR p.value	-	0.000	-	0.014	-	0.004
Observations	378	378	378	378	378	378
County-Borough-Dummy	Yes	Yes	Yes	Yes	Yes	Yes
District Fixed Effects	No	No	Yes	Yes	Yes	Yes
Basic Controls	No	No	No	No	Yes	Yes

Notes: This table shows OLS and 2SLS estimates. The dependent variable is a coverage rate that takes into account eight health-promoting public goods (for details, see Section 4.2). All variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.5. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

our OLS estimate remains positive and statistically significant when adding district fixed effects. However, the magnitude of our OLS estimate decreases from 0.16 to 0.10. Our 2SLS estimate, by contrast, increases slightly, and thus further substantiates the view that the provision of health-promoting public goods improves if the political power of the landless elite grows.

Ideally, we would like to add a lagged value of our measure of public good provision to our regression model in order to further address the concern that our results are driven by an unobserved historical or cultural factor. Unfortunately, this is not possible due to limited data availability. As an alternative, we expand our regression model by five variables that characterize the level of health and public health care in the early 1870s. These variables are the crude death rate, the death rate of newborns, the number of people working in the health sector (per capita), the total number of beds in public hospitals (per capita), and the total number of beds in public maternity hospitals (per capita). Compared with Columns 3 and 4, we find that neither our OLS estimate nor our 2SLS estimate changes in a notable manner due to this model extension (see Columns 5 and 6). Especially for our second-stage estimate, this robustness is quite remarkable since our control variables block many other channels through which soil texture might affect the provision of health-promoting amenities. For example, if soil texture affects dietary habits and thus, due to their effect on health, the demand for health-promoting public goods, we should observe that our 2SLS estimate reacts when controlling for the crude death rate in 1871.

In Table 4, we distinguish between measures that improve the access to

Table 4 Different types of health-promoting public goods (OLS and 2SLS).

	Access to medical care		**Prevention of outbreaks**	
	(1)	(2)	(3)	(4)
Power landless elite	0.068*	0.302*	0.087***	0.343***
	(0.0349)	(0.1585)	(0.0217)	(0.1243)
Approach	OLS	2SLS	OLS	2SLS
SW F-Stat.	-	10.08	-	10.08
SY crit. value (15%/20%)	-	8.96/6.66	-	8.96/6.66
AR p.value	-	0.048	-	0.052
Observations	378	378	378	378
County-Borough-Dummy	Yes	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes	Yes
Basic Controls	Yes	Yes	Yes	Yes

Notes: This table shows OLS and 2SLS estimates. In Columns 1 and 2, the dependent variable is a coverage rate that takes into account three health-promoting public goods that improve the access to medical care. In Columns 3 and 4, the dependent variable is a coverage rate that takes into account five health-promoting public goods that prevent the outbreak of infectious diseases. All variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.5. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

health services for poor people and measures that prevent the outbreak of diseases. According to our arguments developed in Section 2.2, we should observe that the provision of either of the two types of health-promoting public goods increases in the political influence of the landless elite. Our estimates confirm this hypothesis. Interestingly, we see that our results are statistically stronger for preventive measures. We think that this finding is plausible and consistent with our theory since we expect that the landless elites prevent the outbreak of diseases out of self-interest but improve the access to health care services only if the poor are sufficiently organized to threaten the elite. In Section 5.3, we will provide some evidence for this view.

In sum, our baseline results suggest that landless elites implement more health-promoting measures than landowning elites. This finding is fully in line with the arguments presented in Section 2.2. In Section 5.4, we will show the results of a variety of robustness checks to confirm our baseline estimates. However, before turning to these supplementary analyses, we will shed some light on the mechanisms at work.

5.3 Mechanisms

As outlined in Section 2, we hypothesize that the differences in the extent to which landless and landowning elites support public health infrastructure projects can partly be explained with differences in their personal benefits and partly by differences in the risk of social unrest. To substantiate our

Table 5 Mechanism analysis (OLS and 2SLS).

	All public goods		Access		Prevention	
	(1)	(2)	(3)	(4)	(5)	(6)
Power landless elite	0.037*	0.243**	0.007	0.183	0.052***	0.268**
	(0.0205)	(0.1097)	(0.0301)	(0.1530)	(0.0199)	(0.1136)
Strength workers	-0.016	-0.133***	-0.0260	-0.168**	-0.010	-0.109
	(0.0286)	(0.0507)	(0.0415)	(0.0702)	(0.0268)	(0.0545)
Power landless elite ×	0.094*	0.155**	0.129*	0.234**	0.071	0.104
Strength workers	(0.0508)	(0.0680)	(0.0697)	(0.0999)	(0.0502)	(0.0668)
Approach	OLS	2SLS	OLS	2SLS	OLS	2SLS
SW F-Stat.	-	8.88	-	8.88	-	8.88
SY crit. value (15%/20%)	-	8.96/6.66	-	8.96/6.66	-	8.96/6.66
Observations	378	378	378	378	378	378
County-Borough-Dummy	Yes	Yes	Yes	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Basic Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table shows OLS and 2SLS estimates. All non-binary variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.5. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

hypothesis, we estimate the regression model:

$$H_i = \zeta + \beta_1 \cdot U_i + \beta_2 \cdot W_i + \beta_3 \cdot (U_i \times W_i) + \gamma \cdot \mathbf{X}_i + \varepsilon_i. \tag{13}$$

where W_i reflects how much pressure the workers' movements put on the local elites (for details, see Section 4.3). In this model, β_3 shows whether the behavior of the landless elite depends on the strength of the workers' movements. β_1 reflects whether the landless elite promotes the provision of health-promoting public goods out of self-interest. If our theory holds, we should find positive and statistically significant estimates for both β_1 and β_3. Column 1 and 2 of Table 5 illustrate that this is indeed the case. Consistent with our theoretical arguments, we also find that the landless elite facilitates the access to health care services only if the working class people are well organized (Columns 3 and 4) and observe that the landless elite implements public measures that prevent the outbreak and spread of diseases mainly out of self-interest (Columns 5 and 6).

5.4 Additional results

In Sections 5.2 and 5.3, we show results from OLS and 2SLS regressions, suggesting that the provision of health-promoting public goods improves if the local political power of the landless elite increases. In this section, we present a large number of robustness checks to further substantiate this finding.

5.4.1 Additional control variables

We compile data on sixteen demographic characteristics that correlate with both the distribution of the political power and the provision of public goods. Among others, our list includes the illiteracy rate, the population size (log), the number of Catholics (per capita), the urbanization rate, and the number of married people (per capita). Figures C.5 and C.6 suggest that our estimates do hardly change if we add our demographic controls separately to our regression model. Columns 1 and 2 of Table D.8 show that our findings also hold if we simultaneously control for all sixteen variables. However, in the latter case, the first-stage relationship becomes relatively week.

Some public finance studies suggest that administrative structures affect public spending (see e.g. Blesse and Baskaran, 2016). A plausible concern is thus whether unobserved administrative characteristics drive our results. To illustrate that this is unlikely to be the case, we show in Columns 3 and 4 of Table D.8 that our OLS and 2SLS estimates remain positive and statistically significant if we control for the number of towns, rural communities, and estates in the county.

Another objection against our baseline regression model might be that it does not control for economic differences within a district. Since data on income levels is not available, we need to address this concern with five variables that describe the structure of the economy. In particular, we calculate the share of people working in the agricultural, service, mining, education, and transport sector and include these five shares as control variables to our regression model. Columns 5 and 6 of Table D.8 indicate that our results are robust to this model extension.

5.4.2 Sub-sample analyses

We also perform sub-sample analyses to demonstrate the robustness of our OLS and 2SLS estimates. First of all, we show in Column 1 of Table D.9 that our results do not change if we exclude all county boroughs from our sample. In Column 2, we illustrate that our findings also hold if we drop all counties without a town. Column 3 suggests that our estimates remain unchanged if we exclude those provinces that were occupied by Prussia during the 1860s. In Column 4, we restrict our sample to those counties whose borders did not notably change between 1871 and 1911 and find that our OLS and 2SLS estimates continue to be positive and statistically

significant.[30] Furthermore, a series of jackknife analyses shows that our results are not driven by a particular district or province (see Figures C.7 – C.10).

5.4.3 Measurement of public good provision

In our baseline analysis, we use a measure that takes into account eight health-promoting public goods as our dependent variable. As a robustness check, we perform jackknife analyses that consecutively exclude each health-promoting public good. Figures C.11 and C.12 present the results of these analyses. We find that our baseline results are not driven by a particular public good.

We also investigate how the political power of the landless elite affects infant mortality in order to allay the concern that our main results are driven by our measure of public good provision. To this end, we estimate the regression model:

$$\Delta M_i^{t_1-t_2} \;=\; \mu \;+\; \delta \cdot \ln M_i^{t_1} \;+\; \beta \cdot U_i \;+\; \gamma \cdot \mathbf{X}_i \;+\; \varepsilon_i \tag{14}$$

where M^{t_1} denotes the infant mortality rate in period t_1 (1875 – 1879) and $\Delta M^{t_1-t_2} = \ln M^{t_1} - \ln M^{t_2}$ the relative change in the infant mortality rate between periods t_1 and t_2 (1909 – 1913).[31] The estimate of our parameter of interest (β) will be positive if the infant mortality rate decreases in the political power of the landless elite.

Table D.10 presents our regression results when using data on infant mortality. As in our main analysis (see Table 3), we apply three different regression models and report OLS and 2SLS estimates. Our findings show that infant mortality decreases if the political power of the landless elite increases. Since various studies report that health-related amenities play a crucial role in reducing (infant) mortality in developing and industrializing countries (see e.g. Alsan and Goldin, 2019, Chapman, 2019, Gallardo-Albarrán, 2020), we believe that the results shown in Table D.10 can at least partly be explained by the fact that the landless elites in Prussia invested more extensively in public health infrastructure than the landowning elites.

[30] We define a change of the administrative borders as "notable" if a county was divided into two or more counties, or if a town became a county borough.

[31] We define the infant mortality rate as the share of newborns that died within the first year of life. Our data comes from Galloway (2007).

5.4.4 Panel data

So far, we have exploited variation across counties to shed light on the relationship between the political influence of the landless elite and the provision of health-promoting public goods. A weak spot of this approach is that we cannot control for all time-invariant cultural, geographical, and historical confounders. To address this issue, we report results from the panel regression introduced in Section 5.1.3 in Columns 1 and 2 of Table D.11. In Column 1, we use a model in which our index of the political influence of the landless elite is the only explanatory variable. The results suggest that the infant mortality decreases in the political power of the landless elite. Column 2 illustrates that our estimate of interest continues to be negative and statistically significant if we control for county fixed effects, period fixed effects, and twelve time-varying county characteristics.[32] However, compared to Column 1, we observe that the magnitude of our point estimate drops notably.

The results from our OLS panel regressions might be biased because of omitted time-varying county characteristics and measurement error in our measure of political power. To alleviate these concerns, we present results from 2SLS panel estimations in Columns 3 and 4 of Table D.11. We find supportive evidence for the hypothesis that public good provision improves if the political power shifts from the landowning to the landless elite. In particular, Column 4 suggests that the infant mortality rate decreases by 0.39 standard deviations when the political influence of the landless elite increases by one standard deviation.

We believe for two main reasons that the 2SLS estimates produced in our panel analyses need to be interpreted with some caution. First of all, improved public good provision is only one out of many channels through which the political power of the landless elite might affect infant mortality rates. Disentangling these channels is not possible because of limited data availability. Second, we do not have enough control variables to block all alternative channels through which our instrument might affect the infant mortality rate. Consequently, our 2SLS estimates might be biased due to a violation of the exclusion restriction.

[32] Our list of controls includes: the number of Catholics (p.c.), the number of male (p.c.), the number of young people (p.c.) the number of people who were not born in the county (p.c.), the number of marriages (p.c.), the number of deaths (p.c.), the number of births (p.c.), the number of Germans (p.c.), the number military person (p.c.), the urbanization rate, the population growth, and the number of legitimate births (per birth). Our data comes from Galloway (2007). For summary statistics, see Table D.12.

5.4.5 Measurement of political power

To create our basic measure for the local political power of the landless elite, we use an additive aggregation procedure and took into account all county directors, all members of the Prussian House of Representatives, as well as all Prussian members of the *Reichstag* that were active between 1871 and 1911 (for details, see Section 4.1). A number of tests suggests that our main results hold if we modify our measurement approach. First, Table D.13 shows that our point estimates remain positive and statistically significant if we use only one of the three posts. Columns 1 and 2 of Table D.14 illustrate that our results also hold when using a multiplicative aggregation procedure rather than an additive approach. Columns 3 and 4 indicate that our results do not significantly change if we use 1900 rather than 1871 as our starting point.[33] Finally, in our baseline approach, we treat all politicians for which we do not find any biographical information as members of the landowning elite. Table D.15 shows that our estimates hardly change if we exclude these politicians when computing our measure for the distribution of power.

5.4.6 Land inequality

A key difference between our study and many related studies is that we exploit biographical data rather than data on land inequality to measure how the local political power was distributed between the landed and the landless elite. A legitimate question in this regard is whether our novel approach has notable advantages. From a conceptual perspective, we think that our approach is superior because land inequality is only a (potential) determinant of the influence of the landowning elite.[34] Furthermore, land inequality might affect public good provision through other channels than the distribution of the political power.

To illustrate that our measurement approach also creates an empirical added value, we proceed in four steps. First, we exploit data on the distribution of land collected by the Prussian Statistical Office in 1882 and digitized by Becker et al. (2014) to produce a measure of land inequality.[35]

[33] We checked various starting points and observed that our regression results do not depend on this choice. To save space, we only report the estimates for 1900. Results for other starting points are available upon request.

[34] Acemoglu et al. (2008) provide evidence from Columbia, suggesting that a high level of land inequality does not necessarily imply that the landowning elite has great political power.

[35] More specifically, we use the available data to calculate the share of agricultural land

Second, we run a bivariate OLS regression in which our measure of land inequality is the explanatory variable. The R^2 of this regression indicates that land inequality explains only 3.17 percent of the variation in the provision of health-promoting public goods. Third, we replace our measure of land inequality with our measure of political power and repeat the bivariate OLS regression. We find that the R^2 increases by the factor of 7.7 due to this replacement (for further details, see Columns 1 and 2 of Table D.16). Finally, we calculate coefficients of partial determination for both measures and observe that the partial R^2 of our measure of political power is 0.232, while it is only 0.019 for our measure of land inequality.

We also check whether our main findings change in a notable manner when adding our measure of land inequality to our basic regression models. Columns 3 and 4 of Table D.16 show the results of this test. We observe that the relationship between the local political power of the landless elite and the provision of health-promoting public goods remains positive and statistically significant.

5.4.7 Different types of landless elites

A concern regarding our baseline analysis might be that we treat the landless elite as a homogeneous group and thus neglect that there might exist substantial differences in how willing the different members of the landless elite are to support public health infrastructure investments. For instance, Aidt et al. (2010) suggest that the factory owners had a greater interest in these investments than the master craftsmen or bureaucrats in mid-Victorian England. Brown (1989), Krabbe (1985), and Vögele (2001) provide anecdotal evidence from Prussia and Germany that points in a similar direction.

To examine whether "capitalist" elites invest more in health-promoting public goods than other landless elites, we proceed in three steps. In the first step, we use the biographical information that we compiled for each politicians in our database to create a dummy that is equal to 1 if the politician or a close relative of him is a merchant, a banker, or a factory owner. In the next step, we use the same aggregation procedure as in Section 4.1 to produce an index that reflects how influential the capitalist elite was in a particular county. In the final step, we estimate a cross-sectional regression model that includes our measures for the power of the

that belongs to a large landholding. Following Cinnirella and Hornung (2016, 2017), we define a landholding as "large" if its area exceeds 100 ha.

landowning and the capitalist elite. Column 1 of Table D.17 presents the results of our OLS estimation. We find that the political power of the capitalist elite is positively correlated with the provision of health-promoting public goods, while the correlation is negative for the power of the landowning elite. Consistent with the findings of our mechanism analyses (see Section 5.3), we also observe that these correlations are more pronounced for those public goods that prevent the disease outbreaks (see Columns 2 and 3 of Table D.17). Unfortunately, we cannot establish causality at this stage because a valid instrument for the political power of the capitalist elite is not available.

5.4.8 Total public spending

An explanation for our results might be that public spending in general increases if the political influence of the landless elite increases. To test whether this is indeed the case, we digitize balance sheets published by Tetzlaff (1911, 1914). These balance sheets include the total expenditure of all Prussian counties in 1908 and all Prussian municipalities in 1911.[36] We aggregate this data to the county level and use the total expenditures and the total expenditures per capita as a dependent variable in our cross-sectional analyses. Table D.18 presents the estimation results. The OLS estimates indicate a positive and statistically significant relationship between the power of the landless elite and total government spending. The 2SLS results suggest that this finding does not hold when addressing endogeneity issues. We therefore believe that differences in total government spending cannot explain why the landless elite provides more health-promoting public goods than the landowning elite. Consistent with this view, we find that our main results hold when controlling for total government expenditures (see Table D.19).

6 Conclusion

This paper exploits newly digitized data from late-19th/early-20th century Prussia to show that elites increased public health expenditures out of self-interest and to reduce the risk of social turmoil and economic instability.

[36] In our baseline specification, we neglect the time gap and add together all expenditures without adjustments. We run various robustness checks (not reported, but available upon request) to rule out that our results are driven by the way of how we deal with the time gap in our raw data.

More specifically, we provide evidence, suggesting that elites benefited from public health infrastructure projects that make the outbreak and spread of infectious diseases less likely, and therefore supported their realization. This result is consistent with the results reported by Aidt et al. (2010) for 19th century Britain and fits well together with qualitative evidence provided by many historians (see e.g. Brown, 1988, 1989, Krabbe, 1985, Vögele, 2001). In addition, our findings imply that elites improve the access to health care services since they feared social and political upheavals. In line with this result are conclusions by several historians, suggesting that public health insurances were introduced in the German, Austrian, and Russian Empire because of the rising support for the workers' movements (see e.g. Frenkel, 2000, Rosenberg, 2014).

The data that we compiled for this project complements existing data sets on Prussia (see especially Becker et al., 2014, Becker and Cinnirella, 2020, Galloway, 2007), and therefore opens prospects for future political economy research. From our perspective, a very relevant question is which factors determined the distribution of political power between the landowning and landless elite. We also think that it is crucial to pay attention to other public goods in order to get a better understanding of how elites affect development. Finally, we believe that a deeper analysis of the differences within the landless elites is of importance, especially to shed light on the between-city differences in the provision of human- capital promoting public goods. For Prussia, it is extremely cumbersome to run such an analysis because no centralized source exists that provides information regarding the composition of city councils.

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Appendix for online publication

A Additional information on the institutional background

A.1 Administrative structure

The German Empire (*Deutsches Kaiserreich*) was a federal state that was founded in 1871 after the Prussian victory in the Franco-Prussian War. In total, the German Empire consisted of more than 20 member states. The vast majority of them were (semi-)constitutional monarchies.[1] Compared to present-day Germany, the territory of the German Empire was 50 percent larger. The Kingdom of Prussia was, by far, the largest member state of the German Empire, occupying two-thirds of the German territory and hosting three-fifths of the German population. Prussia was also politically dominant since the King of Prussia served as the Emperor of Germany.

The Prussian government applied a hierarchical administrative system to organize its territory (Hubatsch et al., 1975). At the highest level, Prussia consisted of 12 – 14 provinces (*Provinzen*).[2] Most of them were headed by an appointed governor (*Oberpräsident*) and had an indirectly elected parliament.[3] At the second-highest administrative level, Prussia was subdivided into 35 – 36 districts (*Regierungsbezirke*).[4] Apart from their size, these districts differed from the provinces for two main reasons: first, no parliaments existed at the district level, and second, the district governor (*Regierungspräsident*) had to be a senior civil servant.

At the third-highest level, Prussia's administrative system distinguished between counties (*Landkreise*), which in turn consisted of towns (*Städte*), rural communities (*Landgemeiden*), as well as estates (*Güter*), and county

[1]The only exceptions were the Hanseatic cities (*Bremen*, *Hamburg*, *Lübeck*) who used a republican system.

[2]The number of provinces increased in 1877 and 1881 as the province of *Prussia* was divided into two independent parts (*East Prussia*, *West Prussia*) and as *Berlin* was separated from the province of *Brandenburg*. For a list that includes all Prussian provinces, see Table D.1.

[3]The rules that determined the composition of the provincial parliaments varied across provinces and changed over time. We will not describe these rules since provincial parliaments do not play a role in our study. The elected Lord Mayor of *Berlin* served as the governor of the eponymous province.

[4]The total number of districts was 35 in 1871 and increased by 1 in 1905 as the district of *Allenstein* (*East Prussia*) was founded. A list of all districts can be found in Table D.1.

boroughs (*Stadtkreise*).[5] The latter were towns that reached a particular population threshold and decided to become independent.[6] Counties were governed by a county administrator (*Landrat*). The heads of the county boroughs were the mayors of the eponymous towns. A local parliament existed at the county level, as well as in towns and rural communities.

A.2 Political representation at the national, state, and county level.

Section 3 described how municipal councils were elected in late-19th/early-20th century Prussia and explained why the electoral laws privileged the rich in municipal elections. In this section, we complement our description by providing background information on the voting rules that were used in federal, state, and county elections. Although the decisions about the provision of health-promoting public goods were hardly made in county parliaments, the Prussian House of Representatives, and the lower chamber of the parliament of the German Empire (*Reichstag*),[7] we will provide a description of how their members were elected since our measure for the distribution of the local political power between the landowning and the landless elite is based on these politicians (see Section 4.1).

A.2.1 Political representation at the national level

The German Empire was a semi-constitutional monarchy with a bicameral parliament (see Huber, 1988). The upper house (*Bundesrat*) included 58 deputies who were appointed by the governments of the member states. The lower house (*Reichstag*), by contrast, consisted of 397 directly elected politicians. Each of them represented one constituency.[8] The borders of these constituencies were drawn in 1867/71 and did not change over time. The suffrage for the *Reichstag* elections was equal, secret, and restricted to

[5] Both towns and rural communities varied considerably in their size. For instance, in 1871, the smallest rural communities had less than 100 inhabitants, while the largest had more than 15.000 inhabitants (Becker and Cinnirella, 2020).

[6] The actual population threshold varied across Prussian provinces. In most provinces, the threshold was 25,000 inhabitants. The exceptions were the provinces of *Rhineland* (40,000 inhabitants) and *Westphalia* (30,000 inhabitants).

[7] A notable exception were the university hospitals which were provided by the Prussian government. Some public hospitals were owned by counties rather than municipalities.

[8] A candidate required the absolute majority of valid votes to become the representative of a constituency. If no candidate reached an absolute majority in the first election, a runoff election took place between the two strongest candidates. The legislative term of a successful candidate lasted three years until 1888, and five years afterwards.

males aged 25 or older (Ullmann, 1999).

Compared with other elections in Prussia, *Reichtag* elections were considered as relatively fair since the voting weight of a citizen did not depend on his income (Kühne, 1994a). Nevertheless, the elite, and especially the landowning elite,[9] enjoyed several benefits. For example, members of the *Reichstag* did not receive parliamentary allowances until 1906 (see Butzer, 1999). Covering the day-to-day costs and the expenses of being a parliamentarian was thus hardly possible without assets or employees that took care of the everyday businesses of the politician.[10] Another key obstacle for movements that represented the interests of the poor was a series of laws that outlawed all activities and newspapers that aimed to spread social-democratic principles (see Lidtke, 1966).[11]

A.2.2 Political representation at the state level

The Prussian parliament consisted of two chambers. The upper chamber (*Herrenhaus*) mainly included representatives of the nobility and appointed intimates of the Prussian King. The members of the lower chamber (*Abgeordnetenhaus*), by contrast, were elected by the male taxpayers aged 24 or older. The electoral system was a variant of the Three-Class Franchise System (*Dreiklassenwahlrecht*), As explained in detail in Section 3, a key feature of this voting rule is that it translated tax payments into voting power (Becker and Hornung, 2020, Kühne, 1994a).

Elections for the Prussian House of Representatives took place in two steps. In the first step, each constituency was divided into wards (*Urwahlbezirke*) and each ward elected 3 – 6 electoral delegates (*Wahlmänner*).[12] At the ward level, voters were first ranked according to their taxes, and then divided into three groups such that the sum of all tax payments did

[9]The landowning elite benefited especially from the fact that the borders of the constituencies did not change over time, despite notable migration flows. A consequence of this persistence was that rural areas, in particular those in the Eastern provinces, were overrepresented.

[10]A few political parties set up a compensation fund to partly address this problem (see Butzer, 1999).

[11]This series of laws is known as Anti-Socialist laws and was active between 1878 and 1890.

[12]The total number of electoral constituencies was 256 until 1908, and 276 afterwards. Constituencies thus often consisted of several counties and county boroughs. *Berlin* was the only county borough that was subdivided into several constituencies. Wards had to have between 750 and 1750 inhabitants and were designed by the county administrator. Gerrymandering occurred frequently (Kühne, 1994a, Heimann, 2011). Wards elected one electoral delegate per 250 inhabitants.

not vary across these three groups.[13] On the election day, each of the groups held, one by one, a non-secret election to select 1 or 2 electoral delegates. In the second stage of the electoral process, the delegates of a constituency met to elect 1 – 3 men to represent the constituency in the House of Representative during the next legislative period.[14] A candidate became elected if more than 50 percent of the present electoral delegates voted for him (Becker and Hornung, 2020, Heimann, 2011, Kühne, 1994a).[15]

The Prussian elite benefited from the Three-Class Voting System for several reasons. A major reason was that the number of voters differed considerably between the three groups. While the first group often only consisted of 1, 2, or 3 wealthy voters, the third group usually included more than 80 percent of the electorate (see Kühne, 1994a).[16] Furthermore, becoming an electoral delegate was quite unattractive for men with low or intermediate incomes because no compensation was paid for the loss of working hours.[17]

A.2.3 Political representation at the county level

Each county in late-19th/early-20th century Prussia had its own indirectly elected parliament. The members of these parliaments were representatives of the largest landowners (*Großgrundbesitzer*), the rural communities, and the towns. The distribution of seats was determined by two rules: (i) The share of seats allocated to the towns equaled the urbanization rate, if less than half of the inhabitants lived in an urban area. Otherwise, this share was set to 50 percent. (ii) The seats that had not been assigned to the towns were equally distributed between the large landowners and the rural communities (Wagner, 2005).

County administrators were not elected by the members of the county parliaments, but appointed by the Prussian King. The county parliaments

[13] The thresholds that specify which taxpayer belonged to which group were calculated at the municipality level until 1893 and at the ward level afterwards. Relevant for the classification were only the direct taxes (i.e. class-tax, income tax, real estate and property tax, and business tax).

[14] A legislative term lasted three years prior to 1888, and five years afterwards. If a parliamentarian withdrew, a by-election took place.

[15] If no candidate received a majority in the first round, the election was repeated with a smaller pool of candidates. If only two candidates were left and obtained the same number of votes in two subsequent elections, the decision was made by lot.

[16] Becker and Hornung (2020) suggests that a first-class voter had, on average, 17.5 times more influence than a third-class voter.

[17] Kühne (1994a) reports that the men who did not live in the town where the electoral delegates met lost three working days.

could only propose some candidates. This is remarkable because this rule made it impossible that a person with a social-democratic ideology became county administrator in Prussia. Another main reason why this influential position could hardly be filled by a representative of the poor was that a county administrator had either to be a landowner or an administrative lawyer that worked before for the Prussian government.

We cannot fully rule out that the Prussian county parliaments included members of the Social-Democratic Party or another political movement that represented the interests of the poor since complete lists regarding the composition of these parliaments are not available. However, we think for three reasons that their actual number is negligibly small. First, related studies in history suggest that county parliaments were dominated by the local elites (see e.g. Nern, 2011, Wagner, 2005). Second, the representatives of the towns and rural communities were chosen by their parliaments, and thus by wealthy citizens (for more details, see Section 3).[18] Finally, the available lists of county parliamentarians only include men with a high social/economic status.[19]

[18]The large landowners hold a meeting in which they decided who of them becomes a member of the county parliament.

[19]For example, the parliament of the county of *Grevenbroich* (*Westphalia*) consisted of 17 landowners, 7 company owners, 1 jurist, and 1 physician in 1912 (Grevenbroicher Stadtverwaltung, 1912).

B Classification of politicians

As explained in Section 4.1, we collected biographical data on a large number of Prussian politicians and used this data to create a dummy variable for each incumbent that indicates whether he belonged to the landed or the landless elite. This supplementary section provides further details about our coding procedure. In particular, we present a more extensive description of our coding rules and consider several examples.

B.1 Coding rules

We classify a politician as representative of the landed rather than the landless elite if and only if at least one of the following four conditions applies:

(a) One of our sources indicates that the politician owned agricultural land.

(b) One of our sources indicates that the politician had a relative (e.g. father, grandfather, brother, uncle, father-in-law) that owned arable land.

(c) One of our sources indicates that the politician was born, lived, or died at a manor or an agricultural estate.

(d) One of our sources indicates that a landowner with the same family name as the politician existed in the county (or a close-by county) where the politician was born, worked, or died.

A potential objection against our coding rules, and in particular against conditions (c) and (d), might be that their application creates some misclassification. We are little concerned about this issue for two main reasons. First, the number of cases in which our coding decision is only based on condition (c) or (d) is rather small. Second, the measurement error that results from this kind of misclassification decreases the chance that we can find evidence for the hypothesis that public good provision improves when the political power of the landowning elite decreases.

B.2 Coding examples

Example 1: Rudolf Hornig

According to Kühne (1994a), Rudolf Hornig was a member of the *Abgeordnetenhaus* from 1893 to 1903. He represented the constituency *Liegnitz 5*, consisting of the Silesian counties *Haynau-Goldberg* and *Liegnitz*. Due to his mandate, he has a short entry in the biographical handbook published by Bernhard Mann (see Figure B.2). Mann (1988) reports that Rudolf Hornig was born in 1855 and died in 1904. His place of birth was a manor (*Märzdorf*) in the county of *Haynau-Goldberg*. Mann's handbook also indicates that Rudolf Hornig was a Protestant and owned a manor ('*Gutsbesitzer*'). Because of all this information, we classified him as a representative of the landowning elite.

Example 2: Karl Leopold von Reichenbach

Hubatsch et al. (1975) report that Karl Leopold von Reichenbach served as county administrator of *Bunzlau* (Silesia) between 1848 and 1874. The 3rd edition of the book *Gothaisches Genealogisches Taschenbuch der briefadligen Häuser* (published in 1909) shows that Karl Leopold von Reichenbach was born in 1821 as the son of Lorenz Leopold von Reichenbach who owned the manors '*Ober Mois*' and '*Dippeldorf*' (see Figure B.3). Due to his family background, we labeled him as a representative of the landowning elite.

Example 3: Karl Robert-Tornow

Karl Robert-Tornow was county administrator of *Labiau* (1880 – 1991) and member of the *Abgeordnetenhaus* (1888 – 1892). His constituency was *Königsberg 2*, which consisted of the East Prussian counties *Labiau* and *Wehlau*. According to Mann (1988), Karl Robert-Tornow was Protestant and born in 1851 (see Figure B.4). His place of birth was a Pomeranian manor (*Ruhnow*). Haunfelder (1994) indicates that this manor was once owned by Ferdinand Robert-Tornow and that this landowner was a relative of Karl Robert-Tornow. Consequently, we classified Karl Robert-Tornow as a representative of the landowning elite.

Example 4: Ernst Birck

Ernst Birck was the county administrator of *Bergheim* (*Rhineland*) between 1868 and 1876 (Romeyk, 1994). He was born in Cologne in 1848 and died

in 1881 in Bonn. His father was a bureaucrat, his father-in-law a landowner (see Figure B.1). Because of the latter, we labeled Ernst Birck as representative of the landowning elite.

Example 5: Emil Kautz

Emil Kautz served as the county administrator of *Johannisburg* (*East Prussia*) from 1901 to 1904 (Stüttgen, 1980). His Wikipedia page suggests that he was born in a town, called *Hohenstein*, in the county of *Osterode* (*East Prussia*) in 1866. Unfortunately, no further information exist about Emil Kautz. However, Ellerholz and Lodemann (1879) indicate that Franz Kautz and Wilhelm Kautz owned land in *Osterode* in 1879. We presume that Emil Kautz is a relative of these landowners and thus labeled him as a representative of the landowning elite.

Example 6: Rudolph von Oersten

Rudolph von Oersten was the county administrator of *Anklam* (*Pomerania*) from 1853 to 1889. His Wikipedia page reports that he was born in 1819. Other personal information are not available. However, we have four other members of the family "von Oersten" in our database. According to our references, three of them owned a manor. The fourth had a landowning father. Rudolph von Oersten is likely to be a relative of these politicians and we thus classified him as a representative of the landowning elite.

Example 7: Heinrich Macco

Heinrich Macco was a member of the *Abgeornetenhaus* from 1899 to 1918 (Kühne, 1994b). According to Mann (1988), he was born in the city of *Siegen* (*Westphalia)* in 1843. His father was a lawyer, his grandfather and his father-in-law worked as merchants (Gerstein, 1987). Heinrich Macco himself was trained as engineer and was a leading member of an association that represented the interests of the manufacturers (Mann, 1988). Due to all these facts, we labeled him as a representative of the landless elite.

Example 8: Franz Engel

Franz Engel was born in 1799 in *Leobschütz* (*Silesia*) as the son of a master tanner. After graduating from school, he became a tanner and took over the company of his father (Best and Schröder, 1992, Haunfelder, 2004).

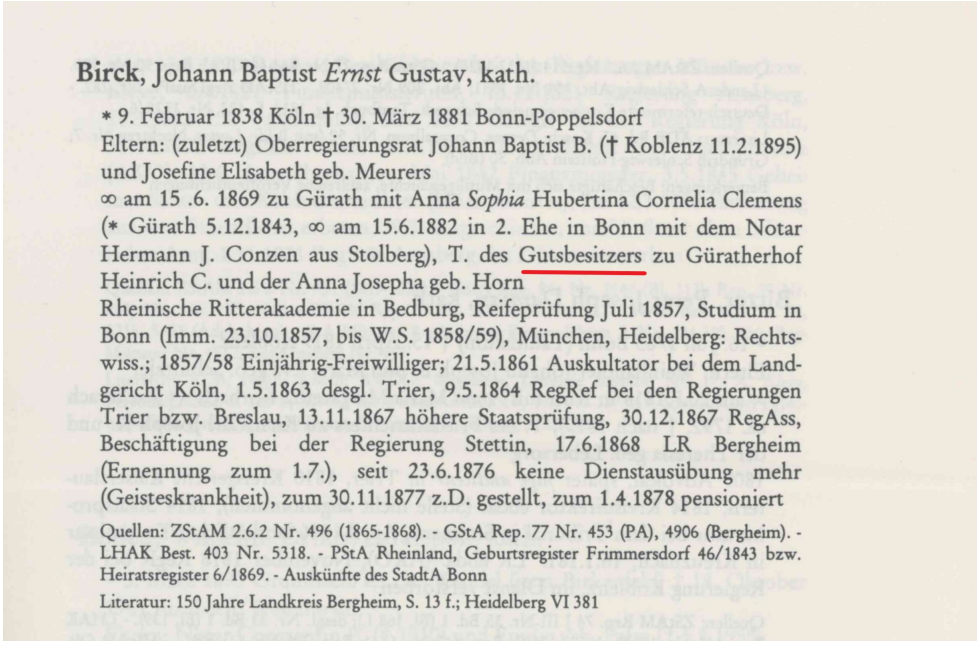
Between 1867 and 1873, Franz Engel was a member of the Reichstag. He represented the constituency *Oppeln 9* (*Leobschütz*). Franz Engel died in his home town in 1877. Because of his family background and his occupational activity, we classified him as a representative of the landless elite.

Example 9: Friedrich von Wolffgramm

Friedrich von Wolffgramm received his noble title in 1890 and served as the county administrator of *Stallupönen* (1872 – 1874) and *Gerdauen* (1874 – 1884). He was born in *Königsberg* (*East Prussia*) in 1836 as the son of a soldier (Janecki, 1893). His mother and his father were both born in *Magdeburg* (*Saxony*), one of the largest Prussian cities at this time. Since Janecki (1893) provides no information suggesting that Friedrich von Wolffgramm owned a manor or had landed relatives, we classify him as a representative of the landless elite. To double check our classification, we use the list published by Ellerholz and Lodemann (1879). In this list, we found no landowner named "Wolffgramm" in the province of *East Prussia*.

B.3 Illustrative material

Figure B.1 Biographical information about Ernst Birck.



Birck, Johann Baptist *Ernst* Gustav, kath.

* 9. Februar 1838 Köln † 30. März 1881 Bonn-Poppelsdorf
Eltern: (zuletzt) Oberregierungsrat Johann Baptist B. († Koblenz 11.2.1895) und Josefine Elisabeth geb. Meurers
∞ am 15 .6. 1869 zu Gürath mit Anna *Sophia* Hubertina Cornelia Clemens (* Gürath 5.12.1843, ∞ am 15.6.1882 in 2. Ehe in Bonn mit dem Notar Hermann J. Conzen aus Stolberg), T. des Gutsbesitzers zu Güratherhof Heinrich C. und der Anna Josepha geb. Horn
Rheinische Ritterakademie in Bedburg, Reifeprüfung Juli 1857, Studium in Bonn (Imm. 23.10.1857, bis W.S. 1858/59), München, Heidelberg: Rechtswiss.; 1857/58 Einjährig-Freiwilliger; 21.5.1861 Auskultator bei dem Landgericht Köln, 1.5.1863 desgl. Trier, 9.5.1864 RegRef bei den Regierungen Trier bzw. Breslau, 13.11.1867 höhere Staatsprüfung, 30.12.1867 RegAss, Beschäftigung bei der Regierung Stettin, 17.6.1868 LR Bergheim (Ernennung zum 1.7.), seit 23.6.1876 keine Dienstausübung mehr (Geisteskrankheit), zum 30.11.1877 z.D. gestellt, zum 1.4.1878 pensioniert

Quellen: ZStAM 2.6.2 Nr. 496 (1865-1868). - GStA Rep. 77 Nr. 453 (PA), 4906 (Bergheim). - LHAK Best. 403 Nr. 5318. - PStA Rheinland, Geburtsregister Frimmersdorf 46/1843 bzw. Heiratsregister 6/1869. - Auskünfte des StadtA Bonn

Literatur: 150 Jahre Landkreis Bergheim, S. 13 f.; Heidelberg VI 381

Sources: *Horst Romyek (1994): Die leitenden staatlichen und kommunalen Verwaltungsbeamten der Rheinprovinz 1816 – 1945.*

Figure B.2 Biographical information about Rudolf Hornig.

Hornig 980
Rudolf

* 1855 (6. Juni) Märzdorf bei Kaiserswaldau, ev.
† 1904 (6. Juni)

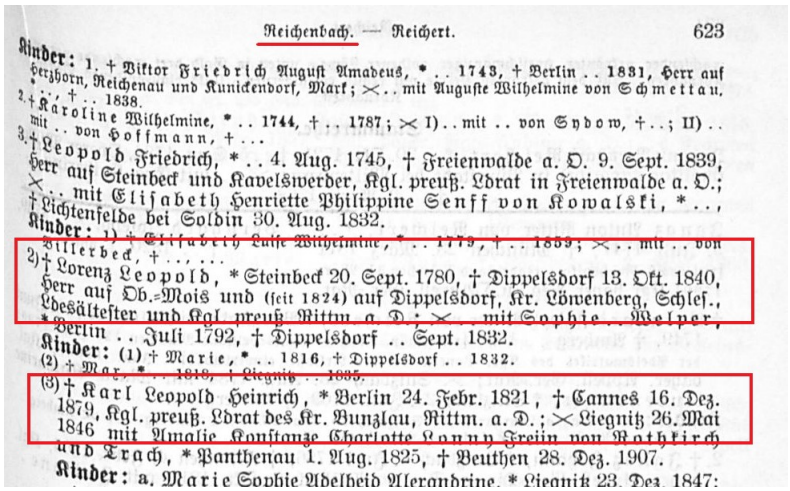
1894 (Gutsbesitzer, Amts- und Gemeindevorsteher; Modelsdorf) –1903 (Gutsbesitzer; Halle/Saale)

18–19: Liegnitz 5 (Haynau-Goldberg, SK+LK Liegnitz); K

Früher Landwirtschaftsbeamter · Kreistag

Source: *Bernhard Mann (1988): Biographisches Handbuch für das preussische Abgeordnetenhaus: 1867 – 1918.*

Figure B.3 Biographical information about Karl Leopold von Reichenbach.



Reichenbach. — Reichert. 623

Kinder: 1. † Viktor Friedrich August Amadeus, * .. 1743, † Berlin .. 1831, Herr auf Herzhorn, Reichenau und Kunickendorf, Mark; ⚭ .. mit Auguste Wilhelmine von Schmettau, * .., † .. 1838.
2. † Karoline Wilhelmine, * .. 1744, † .. 1787; ⚭ I) .. mit .. von Sydow, † ..; II) .. mit .. von Hoffmann, † ...
3. † Leopold Friedrich, * .. 4. Aug. 1745, † Freienwalde a. O. 9. Sept. 1839, Herr auf Steinbeck und Kavelswerder, Kgl. preuß. Ldrat in Freienwalde a. O.; ⚭ .. mit Elisabeth Henriette Philippine Senff von Kowalski, * .., † Lichtenfelde bei Soldin 30. Aug. 1832.

Kinder: 1) † Elisabeth Luise Wilhelmine, * .. 1779, † .. 1859; ⚭ .. mit .. von Willerbeck, † .. .. ..
2) † Lorenz Leopold, * Steinbeck 20. Sept. 1780, † Dippelsdorf 13. Okt. 1840, Herr auf Ob.-Mois und (seit 1824) auf Dippelsdorf, Kr. Löwenberg, Schles., Ldesältester und Kgl. preuß. Rittm. a. D.; ⚭ .. mit Sophie .. Welper, * Berlin .. Juli 1792, † Dippelsdorf .. Sept. 1832.

Kinder: (1) † Marie, * .. 1816, † Dippelsdorf .. 1832.
(2) † Max, * .. 1818, † Liegnitz .. 1885.
(3) † Karl Leopold Heinrich, * Berlin 24. Febr. 1821, † Cannes 16. Dez. 1879, Kgl. preuß. Ldrat des Kr. Bunzlau, Rittm. a. D.; ⚭ Liegnitz 26. Mai 1846 mit Amalie Konstanze Charlotte Lonny Freiin von Rothkirch und Trach, * Panthenau 1. Aug. 1825, † Beuthen 28. Dez. 1907.

Kinder: a. Marie Sophie Adelheid Alexandrine, * Liegnitz 23. Dez. 1847;

Source: *Gothaisches genealogisches Taschenbuch der briefadeligen Häuser (1909).*

Figure B.4 Biographical information about Karl Robert-Turnow.

Robert-Tornow 1897
Karl

* 1851 (14. April) Ruhnow/Pommern, ev.
† 1892 (21. Jan.) Labiau

1888–1892 (Landrat; Labiau)

16,3: Königsberg 2 (Labiau, Wehlau); K
17,1–17,4: Königsberg 2, K

1880/81–1891 Landrat in Labiau

Source: *Bernhard Mann (1988): Biographisches Handbuch für das preussische Abgeordnetenhaus: 1867 – 1918.*

C Additional figures

Figure C.1 Correlation between number of strikes and number of trade union members.

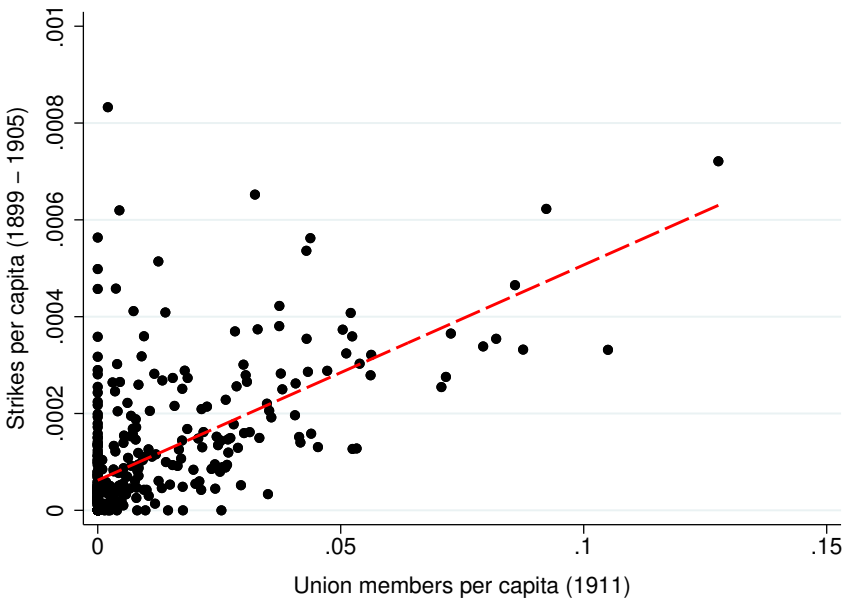


Figure C.2 Correlation between number of strikes and vote share of SPD.

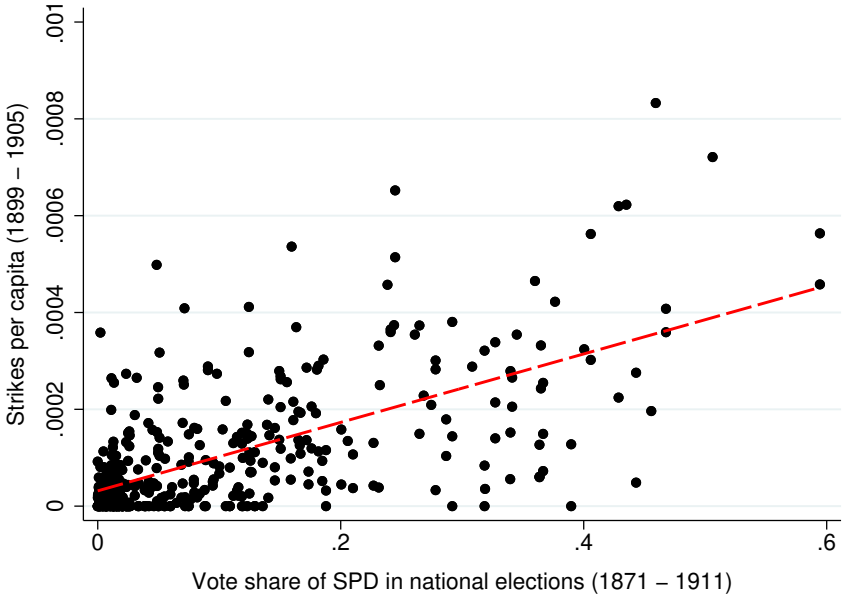


Figure C.3 Correlation between number of trade union members and vote share of SPD.

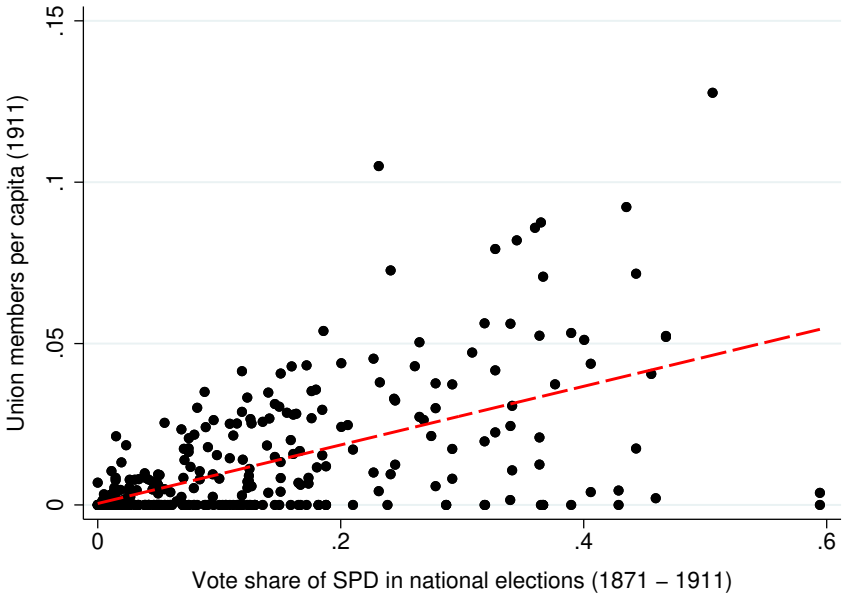


Figure C.4 Political power of the landless elite and soil quality (first-stage relationship).

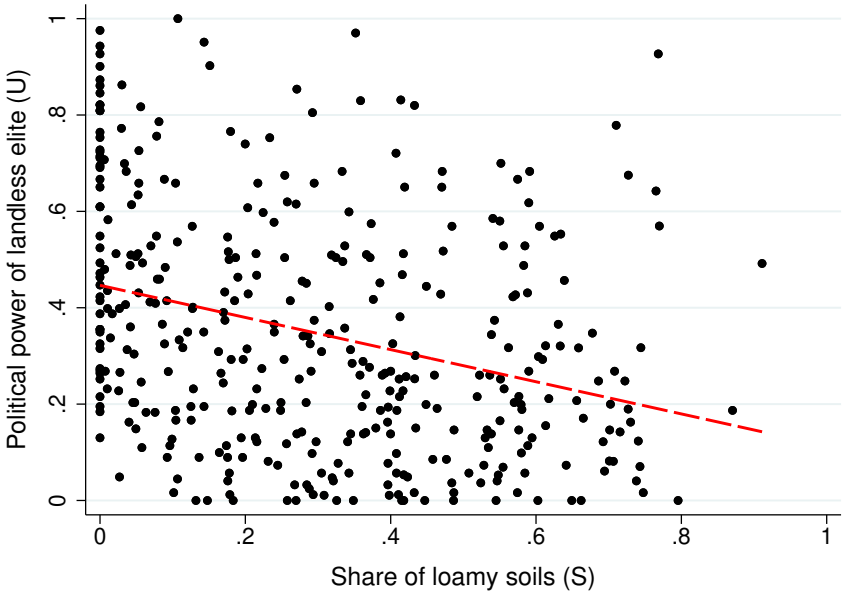
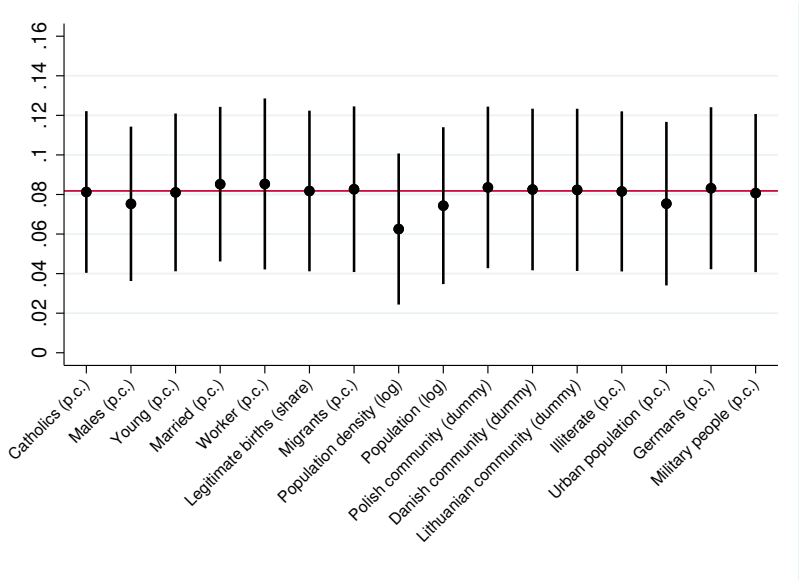
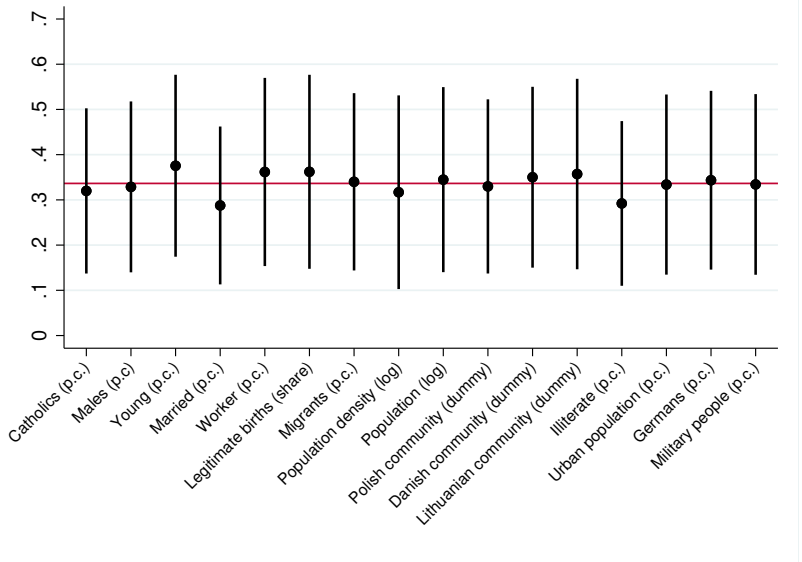


Figure C.5 Jackknife analysis (Demographic controls, OLS).



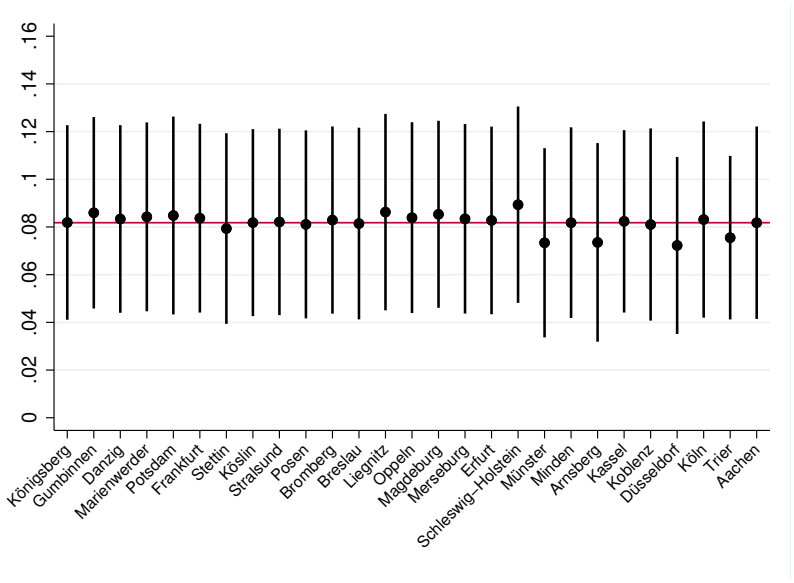
Notes: This figure presents the results of a jackknife analysis in which we separately add 16 country characteristics to the regression model used in Column 3 of Table 3. The black dots indicate the OLS estimates for our main variable of interest. The black vertical lines show the 90 percent confidence intervals. The red horizontal line reflects our baseline OLS estimate (see Column 3 of Table 3).

Figure C.6 Jackknife analysis (Demographic controls, 2SLS).



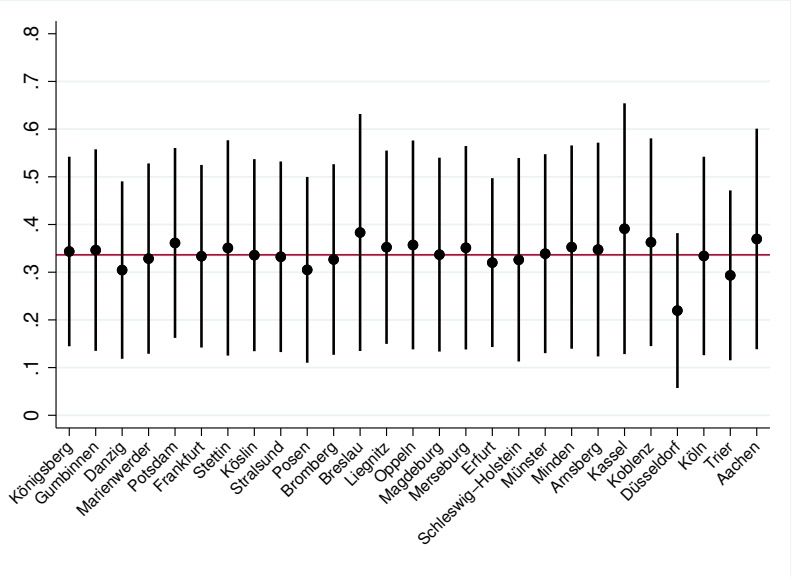
Notes: This figure presents the results of a jackknife analysis in which we separately add 16 country characteristics to the regression model used in Column 4 of Table 3. The black dots indicate the 2SLS estimates for our main variable of interest. The black vertical lines show the 90 percent confidence intervals. The red horizontal line reflects our baseline 2SLS estimate (see Column 4 of Table 3).

Figure C.7 Jackknife analysis (Districts, OLS).



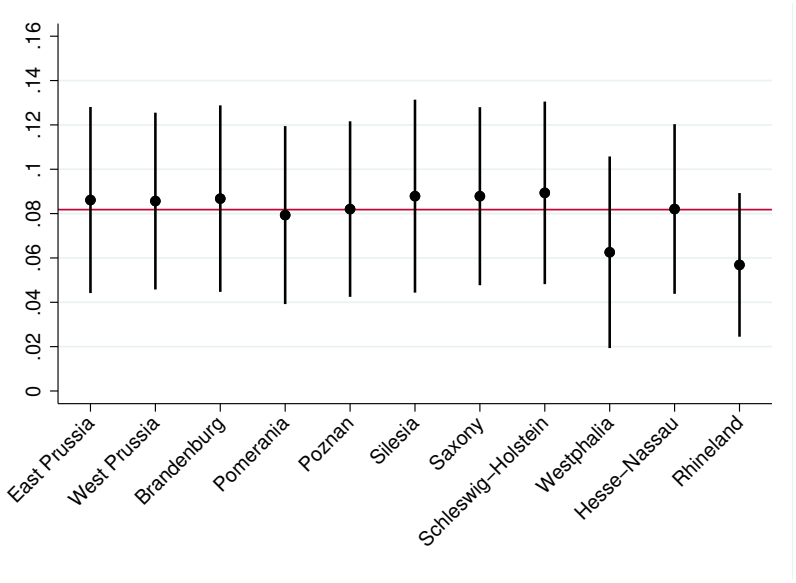
Notes: This figure presents the results of a jackknife analysis in which we consecutively exclude each district from our sample. The black dots indicate the OLS estimates for our main variable of interest. The black vertical lines show the 90 percent confidence intervals. The red horizontal line reflects our baseline OLS estimate (see Column 3 of Table 3).

Figure C.8 Jackknife analysis (Districts, 2SLS).



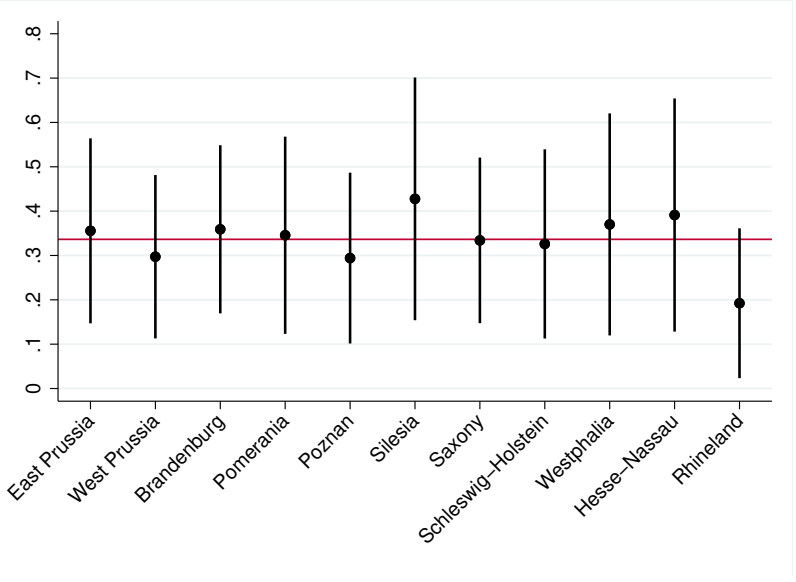
Notes: This figure presents the results of a jackknife analysis in which we consecutively exclude each district from our sample. The black dots indicate the 2SLS estimates for our main variable of interest. The black vertical lines show the 90 percent confidence intervals. The red horizontal line reflects our baseline 2SLS estimate (see Column 4 of Table 3).

Figure C.9 Jackknife analysis (Provinces, OLS).



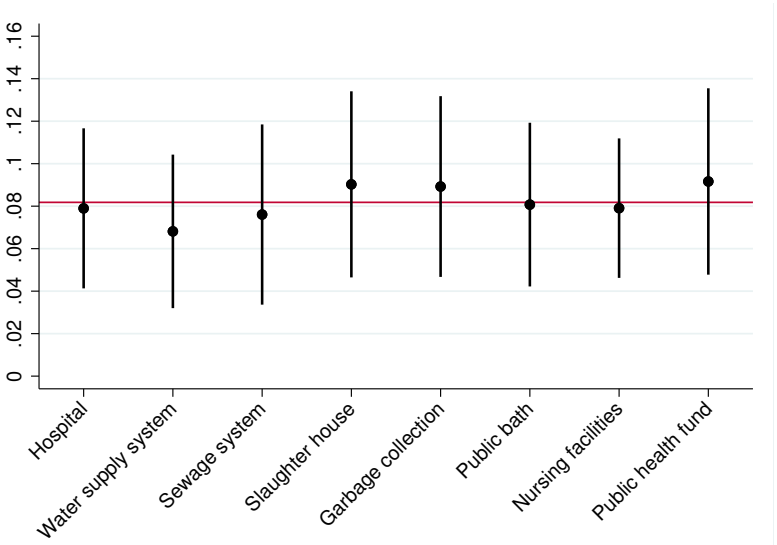
Notes: This figure presents the results of a jackknife analysis in which we consecutively exclude each province from our sample. The black dots indicate the OLS estimates for our main variable of interest. The black vertical lines show the 90 percent confidence intervals. The red horizontal line reflects our baseline OLS estimate (see Column 3 of Table 3).

Figure C.10 Jackknife analysis (Provinces, 2SLS).



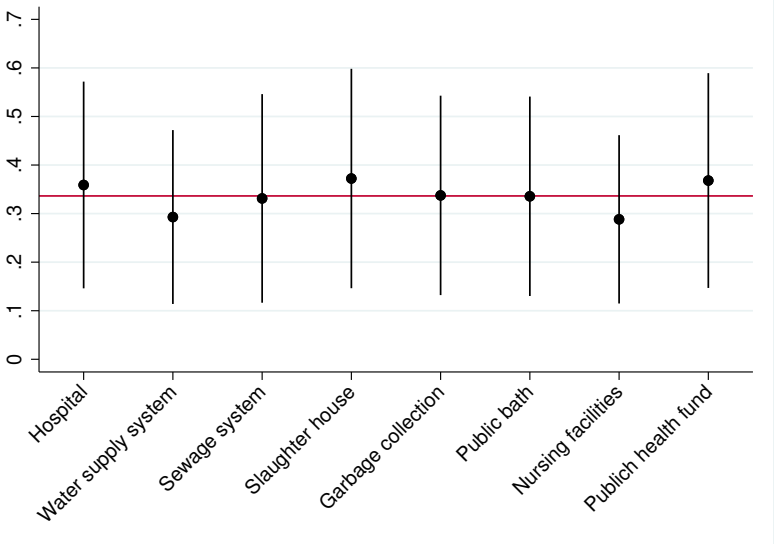
Notes: This figure presents the results of a jackknife analysis in which we consecutively exclude each province from our sample. The black dots indicate the 2SLS estimates for our main variable of interest. The black vertical lines show the 90 percent confidence intervals. The red horizontal line reflects our baseline 2SLS estimate (see Column 4 of Table 3).

Figure C.11 Jackknife analysis (Health-promoting public goods, OLS).



Notes: This figure presents the results of a jackknife analysis in which we consecutively exclude one of our eight health-promoting public goods. The black dots indicate the OLS estimates for our main variable of interest. The black vertical lines show the 90 percent confidence intervals. The red horizontal line reflects our baseline OLS estimate (see Column 3 of Table 3).

Figure C.12 Jackknife analysis (Health-promoting public goods, 2SLS).



Notes: This figure presents the results of a jackknife analysis in which we consecutively exclude one of our eight health-promoting public goods. The black dots indicate the 2SLS estimates for our main variable of interest. The black vertical lines show the 90 percent confidence intervals. The red horizontal line reflects our baseline 2SLS estimate (see Column 4 of Table 3).

D Additional tables

Table D.1 List of Prussian provinces and districts.

Provinces	Districts
East Prussia	Königsberg, Gumbinnen, Allenstein
West Prussia	Danzig, Marienwerder
Berlin	Berlin
Brandenburg	Potsdam, Frankfurt
Pomerania	Stettin, Köslin, Stralsund
Poznan	Posen, Bromberg
Silesia	Breslau, Liegnitz, Oppeln
Saxony	Magdeburg, Merseburg, Erfurt
Schleswig-Holstein	Schleswig Holstein
Hanover	Hanover, Hildesheim, Lüneburg, Stade, Osnabrück, Aurich
Westphalia	Münster, Minden, Arnsberg
Hesse-Nassau	Kassel, Wiesbaden
Rhineland	Koblenz, Düsseldorf, Köln, Trier, Aachen
Hohenzollern	Sigmaringen

Notes: The province of *East Prussia* and *West Prussia* formed together the province of *Prussia* until 1877. The province of *Berlin* belonged to the province of *Brandenburg* until 1881. The district of *Allenstein* was founded in 1905.

Table D.2 Overlaps between different political posts.

Category	Total number of individuals
County director	1629
MP *Abgeordnetenhaus*	1723
MP *Reichstag*	789
County director & MP *Abgeordnetenhaus*	256
County director & MP *Reichstag*	69
MP *Abgeordnetenhaus* & MP *Reichstag*	601
County director & MP *Abgeordnetenhaus* & MP *Reichstag*	77

Notes: Several politicians in our database held more than one political post between 1867 and 1914. In this table, we provides detailed information about the overlap.

Table D.3 Calculation examples: Provision of health-promoting public goods (Waldenburg & Reichenbach, Silesia, 1911)

Public Good	Waldenburg (107 Muni.)		Reichenbach (90 Muni.)	
Hospitals	7	[0.065]	1	[0.011]
Nursing facilities	36	[0.336]	5	[0.056]
Public health fund	2	[0.019]	1	[0.011]
Sewage systems	7	[0.065]	2	[0.022]
Water supply systems	17	[0.159]	1	[0.011]
Waste collection	1	[0.009]	1	[0.011]
Public baths	1	[0.009]	1	[0.011]
Slaughter houses	2	[0.019]	2	[0.022]
Total coverage rate (H)	0.0886		0.0194	

Notes: This table presents two examples to illustrate how we measure the provision of health-promoting public goods. In brackets, we report the share of municipalities that provided a particular public good in 1911. Our basic measure of public good provision is the average of the eight shares.

Table D.4 Calculation example: Distribution of political power (Waldenburg, Silesia, 1871 – 1911).

Year	County administrator	Abgeordnetenhaus (Seat 1)	Abgeordnetenhaus (Seat 2)	Abgeordnetenhaus (Seat 3)	Reichstag
1871	Zedlitz, Conrad von (1)	Lent, Wilhelm (0)	Braun, Karl (0)	Zedlitz, Conrad von (1)	Pleß, Hans von (1)
1872	Zedlitz, Conrad von (1)	Karsten, Lorenz (0)	Braun, Karl (0)	Zedlitz, Conrad von (1)	Pleß, Hans von (1)
1873	Zedlitz, Conrad von (1)	Braun, Karl (0)	Kletschke, Julius (0)	Lipke, Gustav (0)	Pleß, Hans von (1)
1874	Zedlitz, Conrad von (1)	Braun, Karl (0)	Kletschke, Julius (0)	Lipke, Gustav (0)	Pleß, Hans von (1)
1875	Bitter, Rudolf von (0)	Braun, Karl (0)	Kletschke, Julius (0)	Lipke, Gustav (0)	Pleß, Hans von (1)
1876	Bitter, Rudolf von (0)	Braun, Karl (0)	Kletschke, Julius (0)	Lipke, Gustav (0)	Pleß, Hans von (1)
1877	Bitter, Rudolf von (0)	Braun, Karl (0)	Kletschke, Julius (0)	Lipke, Gustav (0)	Pleß, Hans von (1)
1878	Bitter, Rudolf von (0)	Braun, Karl (0)	Kletschke, Julius (0)	Lipke, Gustav (0)	Pleß, Hans von (1)
1879	Bitter, Rudolf von (0)	Bitter, Rudolf von (0)	Schneider, Heinrich (1)	Kletschke, Julius (0)	Pleß, Hans von (1)
1880	Bitter, Rudolf von (0)	Bitter, Rudolf von (0)	Schneider, Heinrich (1)	Kletschke, Julius (0)	Pleß, Hans von (1)
1881	Bitter, Rudolf von (0)	Bitter, Rudolf von (0)	Schneider, Heinrich (1)	Kletschke, Julius (0)	Pleß, Hans von (1)
1882	Dörnberg, Karl von (1)	Bitter, Rudolf von (0)	Lückhoff, Louis (0)	Schneider, Heinrich (1)	Pleß, Hans von (1)
1883	Dörnberg, Karl von (1)	Bitter, Rudolf von (0)	Lückhoff, Louis (0)	Schneider, Heinrich (1)	Pleß, Hans von (1)
1884	Dörnberg, Karl von (1)	Bitter, Rudolf von (0)	Lückhoff, Louis (0)	Schneider, Heinrich (1)	Winckelmann, Carl von (1)
1885	Lieres und Wilkau, Kurt von (1)	Bitter, Rudolf von (0)	Lückhoff, Louis (0)	Hagens, Franz (0)	Winckelmann, Carl von (1)
1886	Lieres und Wilkau, Kurt von (1)	Bitter, Rudolf von (0)	Lückhoff, Louis (0)	Hagens, Franz (0)	Winckelmann, Carl von (1)
1887	Lieres und Wilkau, Kurt von (1)	Bitter, Rudolf von (0)	Lückhoff, Louis (0)	Hagens, Franz (0)	Websky, Egmont (1)
1888	Lieres und Wilkau, Kurt von (1)	Ritter, Paul (1)	Lückhoff, Louis (0)	Simon, Wilhelm (0)	Websky, Egmont (1)
1889	Lieres und Wilkau, Kurt von (1)	Ritter, Paul (1)	Lückhoff, Louis (0)	Simon, Wilhelm (0)	Websky, Egmont (1)
1890	Lieres und Wilkau, Kurt von (1)	Ritter, Paul (1)	Lückhoff, Louis (0)	Simon, Wilhelm (0)	Eberty, Eduard (0)
1891	Lieres und Wilkau, Kurt von (1)	Ritter, Paul (1)	Lückhoff, Louis (0)	Simon, Wilhelm (0)	Eberty, Eduard (0)
1892	Lieres und Wilkau, Kurt von (1)	Ritter, Paul (1)	Lückhoff, Louis (0)	Simon, Wilhelm (0)	Eberty, Eduard (0)
1893	Lieres und Wilkau, Kurt von (1)	Krause, Hermann (0)	Lückhoff, Louis (0)	Lieres und Wilkau, Kurt von (1)	Möller, Heinrich (0)
1894	Lieres und Wilkau, Kurt von (1)	Krause, Hermann (0)	Lückhoff, Louis (0)	Lieres und Wilkau, Kurt von (1)	Möller, Heinrich (0)
1895	Lieres und Wilkau, Kurt von (1)	Krause, Hermann (0)	Lückhoff, Louis (0)	Lieres und Wilkau, Kurt von (1)	Möller, Heinrich (0)
1896	Lieres und Wilkau, Kurt von (1)	Krause, Hermann (0)	Lückhoff, Louis (0)	Lieres und Wilkau, Kurt von (1)	Möller, Heinrich (0)
1897	Lieres und Wilkau, Kurt von (1)	Krause, Hermann (0)	Lückhoff, Louis (0)	Lieres und Wilkau, Kurt von (1)	Möller, Heinrich (0)
1898	Scharmer, Robert (0)	Krause, Hermann (0)	Lückhoff, Louis (0)	Ißmer, Ernst (0)	Sachse, Hermann (0)
1899	Scharmer, Robert (0)	Krause, Hermann (0)	Lückhoff, Louis (0)	Ißmer, Ernst (0)	Sachse, Hermann (0)
1900	Scharmer, Robert (0)	Krause, Hermann (0)	Lückhoff, Louis (0)	Ißmer, Ernst (0)	Sachse, Hermann (0)
1901	Scharmer, Robert (0)	Krause, Hermann (0)	Lückhoff, Louis (0)	Ißmer, Ernst (0)	Sachse, Hermann (0)
1902	Scharmer, Robert (0)	Krause, Hermann (0)	Lückhoff, Louis (0)	Ißmer, Ernst (0)	Sachse, Hermann (0)
1903	Scharmer, Robert (0)	Krause, Hermann (0)	Lückhoff, Louis (0)	Ißmer, Ernst (0)	Sachse, Hermann (0)
1904	Scharmer, Robert (0)	Krause, Hermann (0)	Lückhoff, Louis (0)	Ißmer, Ernst (0)	Sachse, Hermann (0)
1905	Scharmer, Robert (0)	Krause, Hermann (0)	Lückhoff, Louis (0)	Ißmer, Ernst (0)	Sachse, Hermann (0)
1906	Scharmer, Robert (0)	Krause, Hermann (0)	Lückhoff, Louis (0)	Ißmer, Ernst (0)	Sachse, Hermann (0)
1907	Zedlitz-Neukirch, Robert von (1)	Krause, Hermann (0)	Lückhoff, Louis (0)	Ißmer, Ernst (0)	Sachse, Hermann (0)
1908	Zedlitz-Neukirch, Robert von (1)	Krause, Hermann (0)	Lückhoff, Louis (0)	Zedlitz, Octavio von (1)	Sachse, Hermann (0)
1909	Zedlitz-Neukirch, Robert von (1)	Krause, Hermann (0)	Lückhoff, Louis (0)	Zedlitz, Octavio von (1)	Sachse, Hermann (0)
1910	Zedlitz-Neukirch, Robert von (1)	Krause, Hermann (0)	Lückhoff, Louis (0)	Zedlitz, Octavio von (1)	Sachse, Hermann (0)
1911	Zedlitz-Neukirch, Robert von (1)	Krause, Hermann (0)	Lückhoff, Louis (0)	Zedlitz, Octavio von (1)	Sachse, Hermann (0)
	$U^{Admin}_{i,1871-1911} = 0.3902$		$U^{MP_P}_{i,1871-1911} = 0.8211$		$U^{MP_R}_{i,1871-1911} = 0.5365$
	$U_{i,1871-1911} = 0.5826$			$A_{i,1871-1911} = 0.4174$	

Notes: This table presents an example to illustrate how we measure the political power of the landless elite (B). In parentheses, we report whether a politician is representative of the landowning elite. For a formal description of the measurement procedure, see Section 4.1.

Table D.5 Summary statistics (cross-sectional analysis).

Variable	Year/Period	Mean	Std. Dev.	Data Source
Panel A: Measures for the political power of the landless elite				
Additive approach	1871 – 1911	0.3472	0.2475	See Section 4.1.
Multiplicative approach	1871 – 1911	0.4018	0.3008	See Section 4.1.
County director	1871 – 1911	0.2504	0.2835	See Section 4.1.
MP Abgeordnetenhaus	1871 – 1911	0.3909	0.2948	See Section 4.1.
MP Reichstag	1871 – 1911	0.4003	0.3330	See Section 4.1.
Additive approach	1900 – 1911	0.3779	0.2977	See Section 4.1.
Additive approach that excludes the politicians without data	1871 – 1911	0.3507	0.2479	See Section 4.1.
Panel B: Measures for the provision of health-promoting public goods				
Coverage rate (all)	1911	0.1049	0.1927	See Section 4.2.
Coverage rate (access)	1911	0.1304	0.1919	See Section 4.2.
Coverage rate (prevention)	1911	0.0879	0.2032	See Section 4.2.
Panel C: Workers' movement				
Strength of workers' movement	1871 – 1911			See Section 4.3.
Vote share SPD	1871 – 1911			See Section 4.3.
Strikes (p.c.)	1899 – 1905			See Section 4.3.
Union members (p.c.)	1911			See Section 4.3.
Panel D: Instrumental variable				
Share of loamy soils	Time-invariant	0.2979	0.2297	Meitzen (1869, 1894).
Panel E: Basic controls				
Deaths (per capita)	1871	0.0293	0.0053	Galloway (2007)
Stillbirths (per birth)	1871	0.0409	0.0134	Galloway (2007)
People in health sector (p.c.)	1871	0.0013	0.0007	Galloway (2007)
Beds in public hospital (p.c.)	1875	0.0010	0.0013	Engel (1877)
Beds in maternity hospitals (p.c.)	1875	0.00002	0.00015	Engel (1877)
Panel F: Demographic controls				
Catholics (p.c.)	1871	0.3517	0.3821	Galloway (2007)
Male (p.c.)	1871	0.4908	0.0233	Galloway (2007)
Young people (p.c.)	1871	0.4532	0.0357	Galloway (2007)
Married people (p.c.)	1871	0.3361	0.0239	Galloway (2007)
Workers (p.c.)	1871	0.3671	0.0499	Galloway (2007)
People born in other county (p.c.)	1871	0.2068	0.1005	Galloway (2007)
Illiterate (p.c.)	1871	0.0938	0.0871	Becker et al. (2014)
Germans (p.c.)	1875	0.9960	0.0125	Galloway (2007)
Military persons (p.c.)	1875	0.0082	0.0159	Galloway (2007)
Polish community (dummy)	Time-invariant	0.1243	0.3304	Galloway (2007)
Danish community (dummy)	Time-invariant	0.0106	0.1025	Galloway (2007)
Lithuanian community (dummy)	Time-invariant	0.0079	0.0889	Galloway (2007)
Legitimate births (per birth)	1871	0.9208	0.0443	Galloway (2007)
Population (log)	1871	10.8449	0.4411	Galloway (2007)
Population density (log)	1871	-0.1810	1.0007	Galloway (2007)
Urbanization rate	1875	0.2826	0.2099	Galloway (2007)
Panel G: Administrative controls				
Number of towns	1910	2.9656	2.0617	Galloway (2007)
Number of rural communities	1910	81.8466	56.1658	Galloway (2007)
Number of estates	1910	39.7831	43.1363	Galloway (2007)
Panel H: Economic controls				
Employees in agriculture (p.c.)	1871	0.1833	0.0686	Galloway (2007)
Employees in mining (p.c.)	1871	0.0061	0.0175	Galloway (2007)
Employees in transport (p.c.)	1871	0.0107	0.0062	Galloway (2007)
Employees in education (p.c.)	1871	0.0029	0.0011	Galloway (2007)
Employees in service (p.c.)	1871	0.0399	0.0242	Galloway (2007)
Panel I: Other variables				
Share of land owned by large landowners	1882	0.2843	0.2244	Becker et al. (2014)
Relative change in infant mortality	1875 – 1913	0.1991	0.1449	Galloway (2007)
Initial level of infant mortality (log)	1875 – 1879	-1.4879	0.1964	Galloway (2007)
Total public spending (log)	1911	14.8834	1.0296	Tetzlaff (1911, 1914)
Per-capita public spending (log)	1911	3.7599	0.5264	Tetzlaff (1911, 1914)

Notes: This table presents summary statistics for all variables that we use in our cross-sectional analyses.

Table D.6 Balance tests.

Variable	Year	Regression coefficient
Deaths (per capita)	1871	0.236*
		(0.1267)
Stillbirths (per birth)	1871	-0.110
		(0.1219)
Beds in public hospitals (p.c.)	1875	0.394***
		(0.1423)
Beds in maternity hospital (p.c.)	1875	0.353*
		(0.1878)
People in health sector (p.c.)	1871	0.008
		(0.1311)
Catholics (p.c.)	1871	0.069
		(0.1023)
Male (p.c.)	1871	0.130
		(0.1518)
Young people (p.c.)	1871	-0.051
		(0.1106)
Married people (p.c.)	1871	0.050
		(0.1264)
Workers (p.c.)	1871	-0.182
		(0.1186)
People born in other county (p.c.)	1871	0.323***
		(0.1118)
Illiterate (p.c.)	1871	0.025
		(0.0439)
Germans (p.c.)	1875	-0.217
		(0.2015)
Military persons (p.c.)	1875	-0.035
		(0.1476)
Legitimate births (per birth)	1871	0.168**
		(0.0787)
Population (log)	1871	0.472***
		(0.1192)
Population density (log)	1871	0.217***
		(0.0708)
Urbanization rate	1875	0.198*
		(0.1028)
Employees in agriculture (p.c.)	1871	-0.564***
		(0.1114)
Employees in mining (p.c.)	1871	0.275
		(0.1695)
Employees in transport (p.c.)	1871	0.141
		(0.1218)
Employees in education (p.c.)	1871	0.150
		(0.1498)
Employees in service (p.c.)	1871	0.407***
		(0.1104)

Notes: This table presents results from OLS regressions. The reported coefficients reflect the extent to which counties where the political power of the landless elites is relative large ($U > 0.5$) differ from counties where the political power of the landless elites is relative small ($U \leq 0.5$). All regressions include a full set of district fixed effects and a dummy variable that is equal to 1 for county boroughs. We use the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.7 Cross-sectional results (first-stage and reduced-from estimates).

	First-stage estimates			Reduced-form estimates		
	(1)	(2)	(3)	(4)	(5)	(6)
Share of loamy soils	-0.251***	-0.128***	-0.136***	-0.063***	-0.041**	-0.046***
	(0.0454)	(0.0433)	(0.0427)	(0.0156)	(0.0167)	(0.0157)
Observations	378	378	378	378	378	378
County-Borough-Dummy	Yes	Yes	Yes	Yes	Yes	Yes
District Fixed Effects	No	Yes	Yes	No	Yes	Yes
Basic Controls	No	No	Yes	No	No	Yes

Notes: This table present the first-stage and reduced-form estimates for our main 2SLS regressions (see Columns 2, 4, and 6 of Table 3). All variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.5. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.8 Additional control variable (OLS and 2SLS).

	(1)	(2)	(3)	(4)	(5)	(6)
Power landless elite	0.059***	0.264*	0.068***	0.283*	0.047**	0.377*
	(0.0206)	(0.1512)	(0.0224)	(0.1368)	(0.0234)	(0.2087)
Approach	OLS	2SLS	OLS	2SLS	OLS	2SLS
SW F-Stat.	-	4.88	-	6.79	-	4.68
SY crit. value (15%/20%)	-	8.96/6.66	-	8.96/6.66	-	8.96/6.66
AR p-value	-	0.084	-	0.034	-	0.031
Observations	378	378	378	378	378	378
County-Borough-Dummy	Yes	Yes	Yes	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Basic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	No	No	No	No
Administrative Controls	No	No	Yes	Yes	No	No
Industry Controls	No	No	No	No	Yes	Yes

Notes: This table shows OLS and 2SLS estimates. The dependent variable is a coverage rate that takes into account eight health-promoting public goods (for details, see Section 4.2). All variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.5. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.9 Sub-sample analyses (OLS and 2SLS).

	No county boroughs	**One or more than one town**	**Exclude new provinces**	**No border change**
	(1)	(2)	(3)	(4)
		Panel A: OLS estimates		
Power landless elite	0.059***	0.084***	0.090***	0.088***
	(0.0201)	(0.0239)	(0.0246)	(0.0287)
		Panel B: 2SLS estimates		
Power landless elite	0.345***	0.338**	0.402**	0.276**
	(0.1285)	(0.1356)	(0.1854)	(0.1392)
SW F-Stat.	9.77	8.42	5.08	6.65
SY crit. value (15%/20%)	8.96/6.66	8.96/6.66	8.96/6.66	8.96/6.66
AR p-value	0.002	0.008	0.016	0.037
Observations	361	365	335	297
County-Borough-Dummy	Yes	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes	Yes
Basic Controls	Yes	Yes	Yes	Yes

Notes: This table shows OLS and 2SLS estimates. The dependent variable is a coverage rate that takes into account eight health-promoting public goods (for details, see Section 4.2). All variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.5. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.10 Changes in infant mortality rates (OLS and 2SLS).

	(1)	(2)	(3)	(4)	(5)	(6)
Power landless elite	0.470***	0.401*	0.154***	0.516*	0.180***	0.548**
	(0.0496)	(0.2207)	(0.0524)	(0.2990)	(0.0521)	(0.2772)
Approach	OLS	2SLS	OLS	2SLS	OLS	2SLS
SW F-Stat.	-	24.76	-	9.12	-	10.00
SY crit. value (15%/20%)	-	8.96/6.66	-	8.96/6.66	-	8.96/6.66
AR p-value	-	0.095	-	0.074	-	0.048
Observations	378	378	378	378	378	378
Initial Infant Mortality	Yes	Yes	Yes	Yes	Yes	Yes
County-Borough-Dummy	Yes	Yes	Yes	Yes	Yes	Yes
District Fixed Effects	No	No	Yes	Yes	Yes	Yes
Basic Controls	No	No	No	No	Yes	Yes

Notes: This table shows OLS and 2SLS estimates. The dependent variable is the relative change in the infant mortality rate between the late 19th century (1875 – 1879) and the beginning of the early 20th century (1909 – 1913). All variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.5. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.11 Panel regressions (OLS and 2SLS).

	(1)	(2)	(3)	(4)
Power landless elite	-0.237***	-0.026**	-0.443**	-0.389*
	(0.0379)	(0.0119)	(0.1913)	(0.2222)
Approach	OLS	OLS	2SLS	2SLS
SW F-Stat.	-	-	35.58	7.26
SY crit. value (15%/20%)	-	-	8.96/6.66	8.96/6.66
AR p-value	-	-	0.024	0.014
Observations	2,695	2,695	2,646	2,646
County Fixed Effects	No	Yes	No	Yes
Period Fixed Effects	No	Yes	No	Yes
Control Variables	No	Yes	No	Yes

Notes: This table shows OLS and 2SLS estimates. The dependent variable is the 1-year infant mortality rate. All variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.12. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.12 Summary statistics (panel analysis).

Variable	Year/Period	Mean	Std. Dev.	Data Source
Panel A: Distribution of political power				
Power landless elite	1875 – 1910	0.3441	0.2965	See Section 4.1
Panel B: Public good provision				
1-year infant mortality rate	1875 – 1910	0.2244	0.0505	Galloway (2007)
Panel C: Instrumental variables				
Soil × Price Index	1875 – 1910	27.7540	21.5641	Jacobs and Richter (1935), Meitzen (1869, 1894)
Panel D: Control variables				
Catholics (p.c.)	1875 – 1910	0.3579	0.3756	Galloway (2007)
Male (p.c.)	1875 – 1910	0.4894	0.0149	Galloway (2007)
Young people (p.c.)	1875 – 1910	0.4591	0.0316	Galloway (2007)
Marriages (p.c.)	1875 – 1910	0.0391	0.0046	Galloway (2007)
People born in other county (p.c.)	1875 – 1910	0.2471	0.1139	Galloway (2007)
Births (p.c.)	1875 – 1910	0.1906	0.0272	Galloway (2007)
Germans (p.c.)	1875 – 1910	0.9939	0.0159	Galloway (2007)
Military persons (p.c.)	1875 – 1910	0.0082	0.0155	Galloway (2007)
Share of legitimate births	1875 – 1910	0.9235	0.0408	Galloway (2007)
Population growth	1875 – 1910	0.0339	0.0600	Galloway (2007)
Urbanization rate	1875 – 1910	0.3025	0.2141	Galloway (2007)
Deaths (p.c.)	1875 – 1910	0.0786	0.0121	Galloway (2007)

Notes: This table presents summary statistics for all variables that we use in our panel analyses.

Table D.13 Alternative measure of political power (OLS and 2SLS). Part I.

	County director		**MP Abgeordnetenhaus**		**MP Reichstag**	
	(1)	(2)	(3)	(4)	(5)	(6)
Power landless elite	0.062***	0.398**	0.044**	0.469*	0.045**	0.381**
	(0.0209)	(0.1921)	(0.0211)	(0.2479)	(0.0181)	(0.1722)
Approach	OLS	2SLS	OLS	2SLS	OLS	2SLS
SW F-Stat.	-	3.85	-	4.15	-	6.70
SY crit. value (15%/20%)	-	8.96/6.66	-	8.96/6.66	-	8.96/6.66
AR p-value	-	0.004	-	0.004	-	0.004
Observations	378	378	378	378	378	378
County-Borough-Dummy	Yes	Yes	Yes	Yes	Yes	Yes
District Fixed Effects	No	No	Yes	Yes	Yes	Yes
Basic Controls	No	No	No	No	Yes	Yes

Notes: This table shows OLS and 2SLS estimates. The dependent variable is a coverage rate that takes into account eight health-promoting public goods (for details, see Section 4.2). All variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.5. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.14 Alternative measure of political power (OLS and 2SLS). Part II.

	Multiplicative approach		**1900 – 1911**	
	(1)	(2)	(3)	(4)
Power landless elite	0.049**	0.324***	0.068***	0.316***
	(0.0201)	(0.1242)	(0.0170)	(0.1122)
Approach	OLS	2SLS	OLS	2SLS
SW F-Stat.	-	10.41	-	9.59
SY crit. value (15%/20%)	-	8.96/6.66	-	8.96/6.66
AR p-value	-	0.004	-	0.004
Observations	378	378	378	378
County-Borough-Dummy	Yes	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes	Yes
Basic Controls	Yes	Yes	Yes	Yes

Notes: This table shows OLS and 2SLS estimates. The dependent variable is a coverage rate that takes into account eight health-promoting public goods (for details, see Section 4.2). All variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.5. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.15 Alternative measure of political power (OLS and 2SLS). Part III.

	(1)	(2)	(3)	(4)	(5)	(6)
Power landless elite	0.158***	0.263***	0.091***	0.347**	0.079***	0.362***
	(0.0190)	(0.0595)	(0.0241)	(0.1583)	(0.0231)	(0.1399)
Approach	OLS	2SLS	OLS	2SLS	OLS	2SLS
SW F-Stat.	-	26.30	-	7.03	-	8.17
SY crit. value (15%/20%)	-	8.96/6.66	-	8.96/6.66	-	8.96/6.66
AR p-value	-	0.000	-	0.014	-	0.004
Observations	378	378	378	378	378	378
County-Borough-Dummy	Yes	Yes	Yes	Yes	Yes	Yes
District Fixed Effects	No	No	Yes	Yes	Yes	Yes
Basic Controls	No	No	No	No	Yes	Yes

Notes: This table shows OLS and 2SLS estimates. The dependent variable is a coverage rate that takes into account eight health-promoting public goods (for details, see Section 4.2). All variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.5. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.16 Land inequality (OLS and 2SLS).

	(1)	(2)	(3)	(4)
Power landless elite		0.499***	0.062***	0.327**
		(0.0776)	(0.0223)	(0.1471)
Land inequality	-0.178***		-0.094***	-0.016
	(0.0534)		(0.0292)	(0.0558)
Approach	OLS	OLS	OLS	2SLS
R^2	0.03	0.24	0.96	0.93
SW F-Stat.	-	-	-	7.51
SY crit. value (15%/20%)	-	-	-	8.96/6.66
AR p-value	-	-	-	0.014
Observations	378	378	378	378
County-Borough-Dummy	No	No	Yes	Yes
District Fixed Effects	No	No	Yes	Yes
Basic Controls	No	No	Yes	Yes

Notes: This table shows OLS estimates. All variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.5. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.17 Different types of landless elites (OLS).

	All public goods	**Access**	**Prevention**
	(1)	(2)	(3)
Power capitalist elite	0.058**	0.065*	0.052**
	(0.0245)	(0.0378)	(0.0209)
Power landowning elite	-0.054**	-0.037	-0.062***
	(0.0226)	(0.0315)	(0.0216)
Approach	OLS	OLS	OLS
Observations	378	378	378
County-Borough-Dummy	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Basic Controls	Yes	Yes	Yes

Notes: This table shows OLS estimates. All variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.5. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.18 Public spending (OLS and 2SLS).

	Total public spending (log)		**Public spending p.c. (log)**	
	(1)	(2)	(3)	(4)
Power landless elite	0.306***	0.398	0.158***	0.206
	(0.0539)	(0.3015)	(0.0519)	(0.3216)
Approach	OLS	2SLS	OLS	2SLS
SW F-Stat.	-	10.08	-	10.08
SY crit. value (15%/20%)	-	8.96/6.66	-	8.96/6.66
AR p-value	-	0.191	-	0.531
Observations	378	378	378	378
County-Borough-Dummy	Yes	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes	Yes
Basic Controls	Yes	Yes	Yes	Yes

Notes: This table shows OLS and 2SLS estimates. All variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.5. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.19 Control for public spending (OLS and 2SLS).

	(1)	(2)	(3)	(4)
Power landless elite	0.058**	0.339**	0.073***	0.335***
	(0.0234)	(0.1394)	(0.0245)	(0.1264)
Total pub. spend. (log)	0.078***	-0.007		
	(0.0205)	(0.0482)		
Pub. spend. p.c. (log)			0.053***	0.005
			(0.0181)	(0.0312)
Approach	OLS	2SLS	OLS	2SLS
SW F-Stat.	-	7.68	-	8.80
SY crit. value (15%/20%)	-	8.96/6.66	-	8.96/6.66
AR p-value	-	0.011	-	0.005
Observations	378	378	378	378
County-Borough-Dummy	Yes	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes	Yes
Basic Controls	Yes	Yes	Yes	Yes

Notes: This table shows OLS and 2SLS estimates. All variables are standardized to have a mean of 0 and a standard deviation of 1. For summary statistics and a list of controls, see Table D.5. We present robust standard errors in parentheses and apply the following notation to highlight point estimates that are significantly different from zero: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.