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Elite Structure and the Provision of Health-Promoting Public Goods

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Elite structure and the provision of health-promoting public goods.

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Abstract

We compile biographical information on more than 5,000 Prussian politicians and exploit newly digitized administrative data to examine whether landowning and landless elites differ in the extent to which they support health infrastructure projects. Using exogenous variation in soil texture, we present results from 2SLS regressions, suggesting that the provision of health-promoting public goods improves with the political influence of the landless elite. We also provide evidence for two mechanisms: first, landless elites face a higher risk of strikes, and second, they have more economic benefits from improving the health of the poor. Finally, we illustrate that the relevance of these two channels differs for those health-related public amenities that improve the access to medical care and those that prevent the outbreak of infectious diseases.

Key words: biographical data, distribution of power, health, land inequality, landowners, local elites, political power, Prussian history, public good provision, redistribution

JEL classifications: H11, H41, H75, I15, N33, O43, P16

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1 Introduction

A growing number of empirical studies suggests that public infrastructure investments are crucial for reducing infant mortality and improving public health in developing and emerging countries (see Alsan and Goldin, 2019, Beach et al., 2016, Cutler and Miller, 2005, Chapman, 2019, Duflo et al., 2015, Gamper-Rabindran et al., 2010, Gallardo-Albarrán, 2020, Watson, 2006). An urgent question is consequently why governments differ in the extent to which they undertake investments in health infrastructure projects. Perhaps surprisingly, the empirical political economy literature gives only relatively few answers to this question (see e.g. Aidt et al., 2010, Franck and Rainer, 2012, Miller, 2008). In this paper, we study a historical case to fill this research gap. More specifically, we distinguish between *landowning* and *landless* elites and investigate how elite structure affects the provision of health-promoting public goods in a non-democratic industrializing regime.[1]

Addressing our research question is difficult for a variety of reasons. To meet these challenges, we consider late-19th/early-20th century Prussia. Besides data availability, we believe that Prussia is an excellent case for four reasons. First, Prussia was the leading country with regard to the provision of health-promoting public goods at the beginning of the 20th century (Brown, 1989). Second, local authorities were fully responsible for the public investments in health infrastructure (Vögele, 2001). Third, the Prussian electoral laws ensured that local policy decisions were made by wealthy citizens (Dawson, 2019, Krabbe, 1989). Finally, the distribution of local political power and the sanitary problems in Prussia were not much different than in other Western countries that industrialized in the 19th century or today's emerging countries (Konteh, 2009).

The first major challenge when examining whether elites differ in their support for public health infrastructure investments is to create an index, reflecting how the political power was distributed between the landowning and the landless elites. To address this issues, we proceed in three steps. In the first step, we produce a list of all Prussian county directors, all members of the Prussian House of Representatives, and all members of

[1] Our differentiation is consistent with various political economy models that distinguish between two types of elites (see e.g. Galor et al., 2009, Llavador and Oxoby, 2005). 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 since the place of living is a rather imprecise indicator for people's source of wealth in our case.

the German parliament (*Reichstag*). In total, this list includes more than 5,000 Prussian politicians. In the second step, we hand-collect biographical information on all these politicians and exploit this information to classify them. According to our definition, a politician counts as a member of the landowning elite if he owned agricultural estates or had close landowning relatives. In the last step, we compute for each county in late-19th/early-20th Prussia the share of posts that were occupied by the members of the landowning elite.

The second key ingredient for analyzing how elite structure affected the provision of health-promoting public goods in Prussia is a measure that reflects how well-developed the public health infrastructure system was in each county. The difficulty in this respect is that focusing on a single health-promoting public good (e.g. public hospitals or sewage systems) is inappropriate since a sophisticated health infrastructure system has various pillars (Chapman, 2019). In addition, the reasons for why elites oppose or support health infrastructure investments might vary for different types of health-promoting public goods. Consequently, if we pay our attention to only one specific type of health infrastructure, we are likely to get an incomplete understanding of the mechanisms at work. To avoid this pitfall, we use newly digitized administrative data to build a measure that takes into account eight different health-promoting public goods.[2] We also create two sub-indices that differentiate between those public goods that mainly improve the access to medical care and those that prevent the outbreak of infectious diseases.[3]

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. We also observe that the positive correlation holds if we distinguish between public goods that decrease the risk of disease outbreaks and public goods that provide access to medical treatment. To establish causality, we use a two-stage least square approach that exploits natural variation in soil quality

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

[3]In our robustness checks, we use infant mortality as an alternative measure. A key advantage of this approach is that we can run panel regressions. The weak spot is that improved health infrastructure is only one of various channel through which elite structure affects infant mortality.

(for similar approaches, see e.g. Cinnirella and Hornung, 2016, Easterly, 2007, Goni, 2018). Our second-stage estimates indicate that landless elites invest more in health infrastructure than landowning elites. In particular, we see that a one standard deviation increase in the political power of the landless elite improves the provision of health-promoting public goods by 0.3 standard deviations. Common first-stage diagnostics suggest that a weak-instrument bias is relatively unlikely. We also provide evidence, suggesting that our results are unlikely to be driven by a violation of the exclusion restriction.

The theoretical political economy literature presents two key reasons for why the elite of a non-democratic regime might support the provision of human-capital promoting public goods. The first theory is that the elite fears strikes and political turmoil and thus implements policies from which the poor benefit (Acemoglu and Robinson, 2000, 2001, 2005, Aidt and Franck, 2015, 2019, Conley and Temimi, 2001). Consistent with this theory, we find that the landless elites in Prussia invested more in health infrastructure if the workers' movements were well organized. We also observe that this mechanism is especially relevant for those public goods that improve the access to medical care. The second popular theory is that the elite has economic benefits if the human capital of the poor increases (Bourguignon and Verdier, 2000, Galor and Moav, 2006, Galor et al., 2009, Lizzeri and Persico, 2004). In line with this theory, we illustrate that the landless elites in Prussia provided more health-promoting public goods if workspaces were relatively crowded and infectious diseases thus spread quickly among the workforce. This result is completely driven by those health infrastructure projects that prevent outbreaks of diseases.

Our paper contributes to the growing political economy literature that investigates why the provision of health-promoting public goods differs between and within countries. Previous studies put their attention to the consequences of franchise extensions (see Aidt et al., 2010, Fujiwara, 2015, Miller, 2008), democratization (see Besley and Kudamatsu, 2006, Kudamatsu, 2012), political selection (see Bhalotra and Clots-Figueras, 2014, Franck and Rainer, 2012), and government ideology (see Potrafke, 2010, Potrafke and Roesel, 2020). Our focus is different since we examine how power shifts within the wealthy elite of a non-democratic regime affect the provision of health-promoting public goods. Addressing this pending issue is of great relevance because local decisions on infrastructure projects often crucially depend on the policy preferences of the wealthy elites in the developing

world. Furthermore, our study improves the understanding of why public investment in health infrastructure greatly increased in many Western countries during the late-19th/early-20th century.

We also contribute to the literature in development economics that examines how elites, and especially large landowners, affect the provision of human-capital promoting public goods and thus long-run economic growth (see Andersson and Berger, 2019, Cinnirella and Hornung, 2016, Cvrcek and Zajicek, 2019, Galor and Moav, 2006, Galor et al., 2009, Goni, 2018, Nafziger, 2011, Ramcharan, 2010, Vollrath, 2013). Our analysis differs from other analyses because we study the provision of health-promoting public goods rather than the provision of education facilities. This difference is notable since the mechanisms at work are unlikely to be the same for all human-capital promoting public goods. Galor et al. (2009) argue that landed and landless elites have different preferences for public spending on education because the productivity-enhancing effects of improved education are much lower in the agricultural sector than in the other sectors. We think that this logic can hardly be applied to health-promoting public goods since physical fitness is of high importance in the agricultural sector (see e.g. Behrman et al., 1997, Fink and Masiye, 2015, Strauss, 1986). Consistent with this doubt, we provide evidence for two other arguments that explain why a landless elite invests more in the public health infrastructure than a landowning elite.

Finally, our paper contributes to the literature that investigates which political economy factors cause policy reforms in the course of economic development. This literature includes two basic theories. The first theory suggests that a conflict of interests exists between an elite and a poorer class and predicts that the public expenditures for education and health increase in the political power of the poorer class (see e.g. Acemoglu and Robinson, 2000, 2005). The alternative theory implies that changes in the preferences of the elite are the key reason for changes in the provision of human-capital promoting public goods (see e.g. Galor and Moav, 2006, Galor et al., 2009). We provide evidence for both theories and suggest that it depends on the characteristics of a public good whether the first or the second theory applies.

This paper is structured as follows. In Section 2, we inform about our institutional environment. Section 3 describes how we create our key variables. Section 4 presents our empirical strategies and results. Section 5 concludes.

2 Historical background

We consider late-19th/early-20th century Prussia to investigate whether the provision of health-promoting public goods in a non-democratic country depends on the structure of the wealthy elite. In what follows, we briefly describe why Prussia provides an institutional setting that is particularly well-suited for addressing our research question. In Appendix A, we offer additional information, especially on the administrative structure and the voting systems 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).[4] 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,

[4] 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.

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).[5]

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. 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

[5]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).

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. In addition to the electoral laws, the Prussian government used various other measures to reduce the political influence of the working class. For instance, between 1878 and 1890, a series of laws, known as *Socialist Laws*, outlawed all activities and newspapers that spread social-democratic principles (Lidtke, 1966). In Appendix A.2, we provide a more comprehensive description of the voting procedures that were used at the different layers of government and explain in greater detail why they favored the wealthy people of the Prussian society.

3 Main variables

3.1 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).[6] The ideal measure for the local political power of the landless elite in a non-democratic regime is thus:

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

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:

$$A = 1 - U \in [0, 1]. \quad (2)$$

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,[7] (ii) the members of the Prussian House of Representatives, and (iii) the members of the parliament of the German Empire (*Reichstag*).[8] 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,

[6] 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).

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

[8] 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).

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.
		⋮	

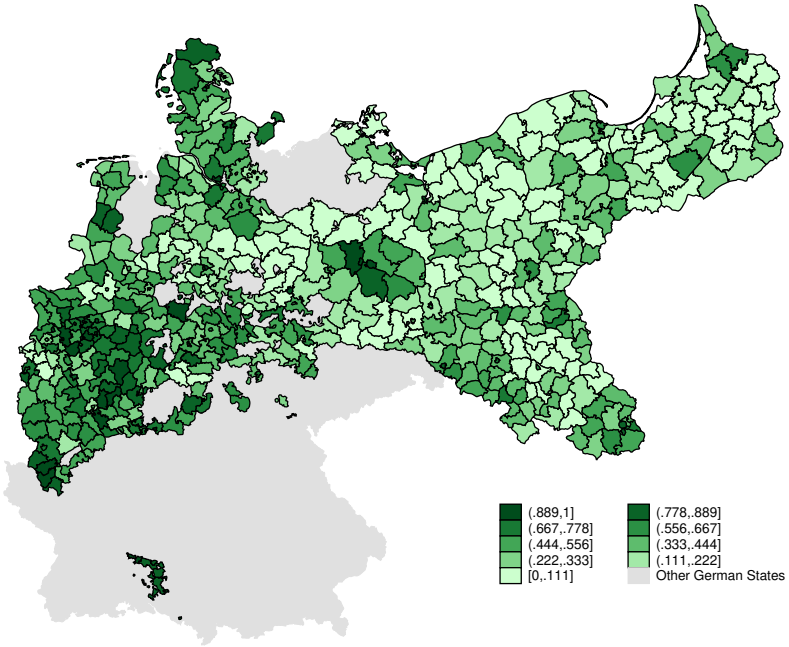
Notes: This table illustrates based on four examples how we document our data collection process. The final documentation file consists of more than 300 pages and is available upon request.

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 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*.[9] 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 the politician (for example cases, see Appendix B.2). For the sake of transparency, we develop a document

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

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.

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 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.[10] 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 $p^{Admin} \in \{0, 1\}$

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

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.[11] In the last step, we aggregate our three sub-indicators, using an additive aggregation rule.[12] 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 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).

3.2 The provision of health-promoting public goods

We use historical records published by the Prussian Statistical Office (see Tetzlaff, 1911, 1914) to create a county-level measure for the provision of health-promoting public goods. A feature of this data source is that it

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

[12] We use an additive aggregation rule in our basic version because we believe that our three sub-indices constitute partial substitutes. In Section 4.4, 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).

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

Public good	Main purpose
Hospitals	Provide access to medical care.
Nursing facilities	Provide access to medical care.
Public health funds	Provide access to medical care.
Sewage systems	Prevent outbreak of diseases.
Water supply systems	Prevent outbreak of diseases.
Waste collection	Prevent outbreak of diseases.
Public baths	Prevent outbreak of diseases.
Slaughter houses	Prevent outbreak of diseases.

provides information on eight different health-related public amenities (see Table 2). This detailedness is remarkable because we can thus take into account that the literature suggests various public goods that improve people's health.[13] In addition, our public goods differ in the way of how their provision affects health. While three of them ease the access to medical care, the others prevent the outbreaks of diseases. In Section 4.3, we exploit this feature of our data set to test whether the actions of the elite depend on the type of the health-promoting public good. In theory, one might expect such a dependency. For example, if elites fear that an infectious disease triggers a shortage of workers and thus reduces their returns on investment, they should mainly provide those public goods that decrease the risk of a disease outbreak.[14]

In Table D.3, we present two examples to show how we measure the provision of health-promoting public goods at the county-level. For each county, we first compute the total number of municipalities, using the data set by Galloway (2007).[15] 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):

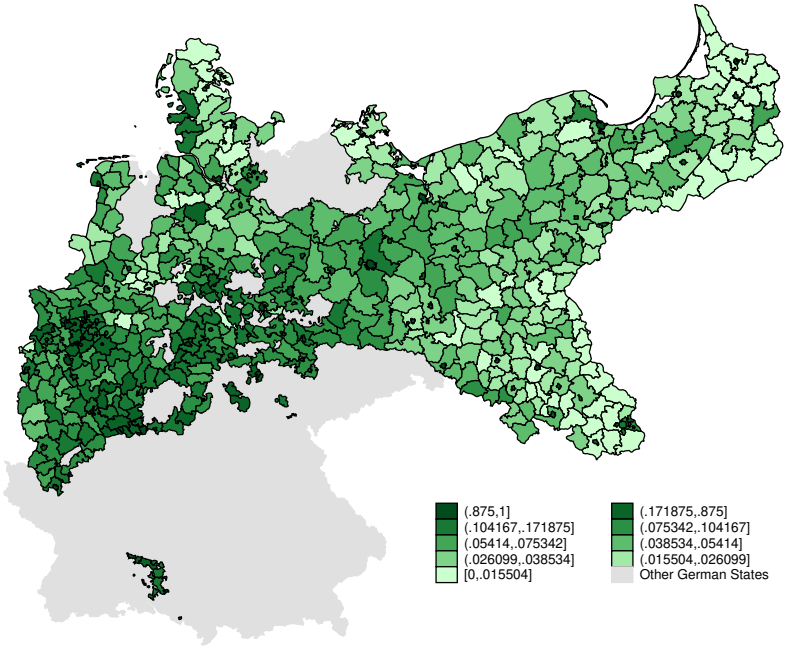
$$h^g_{i,1911} \;=\; \frac{1}{e_i} \cdot \sum_{j=1}^{e_i} D^g_{j,1911} \tag{7}$$

[13] For related studies, see Alsan and Goldin (2019), Beach et al. (2016), Buchmueller et al. (2006), Gallardo-Albarrán (2020), Kesztenbaum and Rosenthal (2017), Kremer et al. (2011), and Watson (2006).

[14] If elites have the aforementioned fear, improving the access to medical care is only a second-best solution because this cannot prevent that there will be sick leaves if an infectious disease breaks out.

[15] 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.

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.

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 Empirical analysis

4.1 Identification strategy

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

$$H_i = \zeta + \beta \cdot U_i + \gamma \cdot \mathbf{X}_i + \varepsilon_i. \tag{9}$$

Our parameter of key interest is β, showing how the provision of health-promoting public goods changes if the political power of the landless elite increases. Put differently, a positive estimate of β suggests that landless elites invest more in health infrastructure than landowning elites.

To establish causality, we present results from a two-stage least squares (2SLS) approach that exploits natural variation in soil texture to create exogenous variation in the local political power of the landless elite (for similar approaches, see Cinnirella and Hornung, 2016, Goni, 2018). Our first-stage regression model is thus:

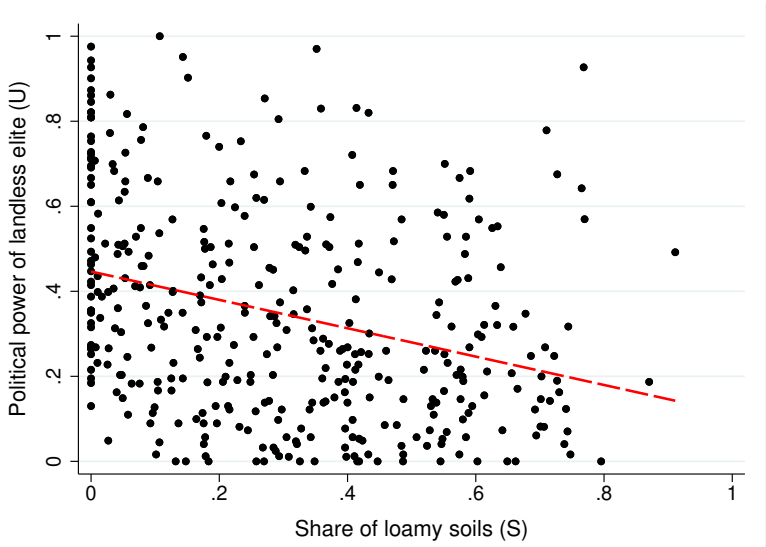
$$U_i = \kappa + \alpha \cdot S_i + \delta \cdot \mathbf{X}_i + \eta_i. \tag{10}$$

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 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 2), 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 3).

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

Figure 3 Political power of the landless elite and soil quality (first-stage relationship).



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.

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).[16]

[16]In 1871, Prussia consisted of 20 county boroughs and 402 counties. Our baseline sample will 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 county borders in the province of *Hanover* changed too drastically over time to apply a matching procedure.

4.2 Main 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. Second, all non-binary variables are 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[17] and a measure that reflects how powerful the landless elite was between 1871 and 1911.[18] 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 ($\widehat{\beta}_{OLS} = 0.16$).[19] 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.6).

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.[20] We observe that

[17] 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.

[18] 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 4.4, we show that our results do not significantly change if we replace 1871 with another year.

[19] 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).

[20] Including district fixed effects is especially demanding for our 2SLS approach because

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 3.2). 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 shifts from the landless to the landowning elite.

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

they absorb a substantial share of the natural variation in soil quality. This also explains why strength of our instrumental variables decreases slightly.

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	0.069**	0.302*	0.087***	0.343***
	(0.0352)	(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: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

observe that our 2SLS estimate reacts when controlling for the crude death rate in 1871.

A feature of our data is that it includes information on various health-promoting public goods. These public goods differ in the way of how they affect health: while three of them improve the access to medical care, the others prevent the outbreaks of infectious diseases. In Table 3, we neglect this difference and use a measure that takes into account all health-promoting public goods as the dependent variable. In Table 4, we address this issue and differentiate between the two different types. Our results suggest that the provision of both types improves in the political power of the landless elite. However, the positive effect is statistically more significant for those public goods that prevent the outbreak of infectious diseases.

In sum, our regression results clearly suggest that landless elites provide more health-promoting public goods than landowning elites. In Section 4.4, we will present the results of several robustness checks to substantiate our main finding. However, before we turn to these supplementary analyses, we will shed light on the mechanisms at work.

4.3 Mechanisms

The theoretical political economy literature suggests two main reasons for why an elite of a non-democratic regime might support the provision of human-capital promoting public goods. The first reason is that an elite

might thus reduce the risk of strikes and social turmoils. (Acemoglu and Robinson, 2001, 2005, Conley and Temimi, 2001). The second reason is that an elite might enjoy income gains due to the complementarities between physical and human capital (Bourguignon and Verdier, 2000, Galor and Moav, 2006). Below, we will illustrate that both mechanisms play a role in our case. We will also show that their relevance differs for our two different types of health-promoting public goods.

4.3.1 Risk of strikes

A key prediction of various political economy models is that elites of non-democratic regimes fear strikes and other forms of social unrest, and thus implement redistribution policies that improve the wealth of the poor (see Acemoglu and Robinson, 2000, 2001, 2005, Aidt and Franck, 2015, 2019, Boix, 2003, Conley and Temimi, 2001). Consequently, a reason for why a landless elite provides more health-promoting public goods than a landowning elite might be that the workers in the non-agricultural sectors can organize a large-scale protest more easily than the agricultural workers. For late-19th/ early-20th century Prussia, this explanation might play a role because the workers' movements that existed at that time were largely dominated by non-agricultural workers (see Kocka, 1983, Kühne, 1994a). Furthermore, the Prussian workers' movements often demonstrated against poor health conditions and improving the access to health care was one of the major objectives of the Social Democratic Party (see Rosenberg, 1967, Tenfelde and Volkmann, 1981, Tennstedt, 1983).[21]

To show that differences in the strength of workers' movements can indeed serve as an explanation for why the landless elites provide more health-promoting public goods, we estimate the regression model:

$$H_i = \zeta + \beta \cdot B_i + \sigma \cdot W_i + \pi \cdot (B_i \times W_i) + \gamma \cdot \mathbf{X}_i + \varepsilon_i. \tag{11}$$

where W denotes the strength of the workers' movements. In line with Bauernschuster et al. (2020), we use the vote share of the Social Democratic Party (SPD) to proxy how well the workers were organized. In particular, we set W equal to 0 (1) if the vote share of the SPD is below (above) the 75 percent quantile.

[21] Among historians, it is widely acknowledged that Bismarck reformed the public health insurance system in 1883 to win voters who were attracted by the policy proposal of the Social Democratic Party (see e.g. Rosenberg, 1967).

Table 5 Mechanism analysis: risk of strikes (OLS and 2SLS).

	All public goods		Access		Prevention	
	(1)	(2)	(3)	(4)	(5)	(6)
Landless elite	0.042**	0.259***	0.015	0.216	0.056***	0.274***
	(0.0206)	(0.0999)	(0.0316)	(0.1389)	(0.0194)	(0.0864)
SPD	-0.084	-0.439***	-0.140	-0.654***	-0.048	-0.301**
	(0.0657)	(0.1402)	(0.0956)	(0.2041)	(0.0582)	(0.1346)
Landless elite × SPD	0.096**	0.194**	0.136**	0.321***	0.070	0.115*
	(0.0467)	(0.0788)	(0.0617)	(0.1051)	(0.0443)	(0.0697)
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
AR p.value	-	0.006	-	0.067	-	0.007
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: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Columns 1 and 2 of Table 5 present the OLS and 2SLS results from estimating (11). As in our baseline regressions, we exploit a coverage rate that takes into account eight health-promoting public goods as the dependent variable (for details, see Section 3.2). We observe that an increase in the political influence of the landless elite has a positive and statistically significant effect on the provision of health-promoting public goods, independently of whether workers' movements are strong or weak ($\beta > 0$). We also observe that this positive effect becomes larger if the workers are well organized ($\pi > 0$). The latter finding is consistent with the hypothesis that elites provide more public goods if they face a high protest risk. The former result shows that differences in the strength of the workers' movements are not the only reason for why landowning and landless elites differ in their decisions on the provision of health-promoting public goods.

In Columns 3 – 6 of Table 5, we examine whether the role of the workers' movements differs for those health-promoting public goods that improve access to medical care and those that prevent disease outbreaks. Our results suggest that such a difference indeed exists. In particular, we observe that the landless elite only improves the access to medical care if workers' movements are strong.[22] By contrast, the provision of health-

[22]Besides the direct health effects, the related literature in history provides several arguments for why workers benefited from public hospital and nursing facilities. For example, Nieberding (2003) points out that the size of the sickness allowance varied depending on whether a sick worker visited a hospital.

promoting public goods that prevent outbreaks of diseases increases in the political power of the landless elite, regardless of how well the workers' movements are organized.

4.3.2 Personal benefits

The related literature suggests different reasons as to why the wealthy elite might personally benefit if the health of the poor improves. A first is that infectious diseases have spillover effects (Lizzeri and Persico, 2004). In particular, if an infectious disease breaks out among the poor people, the wealthy elite also faces an infection risk because the poor and the rich people do not live fully separated from each other. The elite can thus increase its own life expectancy when providing public goods that prevent the outbreak and spread of infectious diseases.

To test whether differences in the fear of infection explain why landless elites provide more health-promoting public goods than landed elites, we require data that reflects how extensive the poor and the rich exchange with each other. Unfortunately, such data does not exist for Prussia. To substantiate that the landless elite was at least in part motivated by the fear of infection, we therefore need to refer to the related qualitative literature. For instance, Krabbe (1985) reports that the fear of infectious diseases was the key reason for why the cities of Düsseldorf and Halle established a modern water supply system (see also Vögele, 2001).

Brown (1988, 1989) suggests that landless elites support the provision of health-promoting public goods since they economically benefit from these public goods. In particular, landless elites were often engaged in industrial branches in which people work together in relatively confined spaces. The risk that infectious diseases spread quickly among their workers was thus higher for the landless elites than for the landowning elite. Consequently, the economic losses that the landless elites have if an infectious disease breaks out are relatively high. To avoid these losses, the landless elites promote the provision of public goods that prevent outbreaks of infectious diseases. We test this hypothesis with the regression model:

$$H_i \;=\; \zeta \;+\; \beta \cdot B_i \;+\; \phi \cdot C_i \;+\; \lambda \cdot (B_i \times C_i) \;+\; \gamma \cdot \mathbf{X}_i \;+\; \varepsilon_i. \tag{12}$$

where C is a proxy for how crowded the work spaces were in the non-agricultural sector. More specifically, we use occupational data digitized by Becker et al. (2014) to calculate the ratio between the number of employed

Table 6 Mechanism analysis: personal benefits (OLS and 2SLS).

	All public goods		Access		Prevention	
	(1)	(2)	(3)	(4)	(5)	(6)
Landless elite	0.072***	0.239**	0.061*	0.226*	0.076***	0.238**
	(0.0242)	(0.0934)	(0.0365)	(0.1229)	(0.0218)	(0.0964)
Workers per firm	-0.040	-0.038	-0.071	-0.063	-0.021	-0.022
	(0.0387)	(0.0288)	(0.0496)	(0.0509)	(0.0382)	(0.0266)
Landless elite × Worker	0.084*	0.068*	0.081	0.060	0.083*	0.071*
per firm	(0.0429)	(0.0407)	(0.0562)	(0.0578)	(0.0427)	(0.0401)
Approach	OLS	2SLS	OLS	2SLS	OLS	2SLS
SW F-Stat.	-	9.83	-	9.83	-	9.83
SY crit. value (15%/20%)	-	8.96/6.66	-	8.96/6.66	-	8.96/6.66
AR p.value	-	0.006	-	0.051	-	0.009
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: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

workers and the number of self-employed people in the mining and textile industry. The basic idea is that the number of self-employed persons can serve as a proxy for the number of firms and our ratio thus as a proxy for the average number of workers per firm.

In Table 6, we show results from estimating (12). The structure of this table is the same as in Table 5. Consistent with Brown's hypothesis, we find that the landless elite provides more health-promoting public goods if the work spaces are narrow and infectious diseases thus likely to spread quickly (see Columns 1 & 2). Columns 3 – 6 suggest that this result is fully driven by those health-promoting public goods that prevent the outbreak of infectious diseases. From a theoretical perspective, we believe that this finding is plausible because improving the access to health care mainly increases the chance of survival, while prevention measures reduce the number of infected people and thus sick leaves.[23]

A question that might arise from Table 6 is how the landless elites in late-19th/ early-20th century Prussia supported the provision of health-promoting public goods. According to Krabbe (1985) and Vögele (2001), this happens in different ways. First of all, the members of the landless elite often served as local parliamentarians and used their posts to influence

[23]The literature suggests additional reasons for why the landless elites benefited from health-promoting public goods that prevent the outbreak of infectious diseases. For instance, Vögele (2001) argues that these public goods increased the rental incomes of the landless elites. Because of limited data availability, we cannot empirically support these arguments.

policy decisions. For instance, in the city of Dortmund, almost 60 percent of all municipal councilors were merchants, bankers, or firm owners between 1870 and 1890 (Krabbe, 1985). Another way was that the landless elites provided financial aid. For example, in the city of Essen, the local factory owners financially supported the construction of the public water supply system (Krabbe, 1985).

4.4 Additional results

In Section 4.2, 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 various robustness checks.

4.4.1 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.1 and C.2 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.7 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.7 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 are not available, we need to address this concern with 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.7 indicate that our results are robust to this model extension.

4.4.2 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.8 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.[24] Furthermore, a series of jackknife analyses shows that our results are not driven by a particular district or province (see Figures C.3 – C.6). Finally, if we use individual measures for the provision of health-promoting public goods in urban and rural municipalities, we observe that the distribution of political power between the landless and the landowning elite affects public good provision only in rural municipalities (see Table D.9). This finding is reassuring because wealthy landowners were hardly members of the urban municipal councils and thus had only very little influence on the policy decisions in urban communities in Prussia.

4.4.3 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 3.1). A number of tests suggests that our main results hold if we modify our measurement approach. First, Table D.10 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.11 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

[24] 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.

than 1871 as our starting point.[25] 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.12 shows that our estimates hardly change if we exclude these politicians when computing our measure for the distribution of power.

4.4.4 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.7 and C.8 present the results of these analyses. We find that our baseline results are not driven by a particular public good.

Some related studies exploit data on infant mortality to measure the provision of health-promoting public goods (see e.g. Franck and Rainer, 2012, Bhalotra and Clots-Figueras, 2014). Compared to our approach, using infant mortality rates has advantages and disadvantages. A key 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 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 by the provision of health-promoting public goods.

We estimate the following regression model to examine how the political power of the landless elite affects infant mortality:

$$\Delta M_i^{t_1 - t_2} \;=\; \mu \;+\; \delta \cdot \ln M_i^{t_1} \;+\; \beta \cdot B_i \;+\; \gamma \cdot \mathbf{X}_i \;+\; \varepsilon_i \tag{13}$$

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).[26] 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.13 presents our regression results when using data on infant

[25] 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.

[26] 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).

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 political power shifts from the landowning elite to the landless elite. Since various studies find that health-related amenities play a crucial role in reducing (infant) mortality in developing and industrializing countries (see Alsan and Goldin, 2019, Chapman, 2019, Gallardo-Albarrán, 2020), we believe that the results reported in Table D.13 can at least partly be explained by the fact that the landless elites in Prussia invested more intensively in public health infrastructure than the landowning elites.

4.4.5 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.[27] 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.[28] 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.14). Finally, we calculate coefficients of partial determination for

[27] 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.

[28] More specifically, we use the available data to calculate the share of agricultural land that belongs to a large landholding. Following Cinnirella and Hornung (2016, 2017), we define a landholding as "large" if its area exceeds 100 ha.

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.14 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.

4.4.6 Total public spending

In Section 4.3, we shed light on two reasons for why the landless elites provide more health-promoting public goods than the landowning elites. On the one hand, we show that landless elites face a higher risk of strikes whereas, on the other hand, landowning elites benefit more from health infrastructure investments. Another potential explanation is that public spending in general increases if power shifts from landowning to landless elites. 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 towns and rural communities in 1911.[29] We aggregate this data to the county level and use both the total expenditures and the total expenditures per capita as dependent variable in our cross-sectional analyses. Table D.15 shows the 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.16).

4.4.7 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

[29] 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.

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 3.1 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 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 4.3), 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.

4.4.8 Panel data

So far, we have exploited variation across counties to examine whether changes in the political power of the landless elite affect the provision of health-promoting public goods. A weak spot of this approach is that we cannot control for all cultural, geographical, and historical confounders. In this section, we use the following panel regression model to address this issue:

$$M_{i,t} = \zeta + \beta \cdot B_{i,t-1} + \gamma \cdot \mathbf{X}_{i,t} + \theta_t + \xi_i + \varepsilon_{i,t} \tag{14}$$

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. We use the infant mortality rate (M) as dependent variable since no time-varying data exists for our baseline measure of public good provision (see also Section 4.4.4).

Columns 1 and 2 of Table D.18 present results from estimating (14). In Column 1, we apply a regression model in which our measure for the political power of the landless elite is the only explanatory variable. The results suggest that the infant mortality rate is lower when the power of the landless elite is high. Column 2 shows that our estimate of interest remains negative and statistically significant if we control for county fixed effects, period fixed effects, and twelve time-varying county characteristics.[30] However, compared to Column 1, we observe that the magnitude of our point estimate drops notably.

The results from our OLS panel regressions might still be biased due to unobserved time-varying county characteristics and measurement error in our measure of political power. To mitigate these issues, 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.[31] The econometric logic behind our instrumentation strategy is that the interaction between an exogenous variable (share of loamy soils) and an endogenous variable (price index) is also exogenous (Bun and Harrison, 2019). The economic intuition is that prices correlate with revenues and, due to political system in Prussia, also with the distribution of the political power.

Columns 3 and 4 of Table D.18 report the regression results of our 2SLS panel estimations. We find evidence, suggesting that the provision of health-promoting public goods improves in the political influence of the landless elite. In particular, Column 4 suggests that the infant mortality rate decreases by 0.39 standard deviations if the political power of the landless elite increases by one standard deviation.

We believe for two main reasons that the 2SLS estimates produced in

[30] 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.19.

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

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.

5 Conclusion

In this paper, we examine whether the landless elites in late-19th/early-20th century Prussia undertook more health infrastructure investments than the landowning elites. To address this question, we digitize administrative data on eight health-promoting public goods and hand-collect biographical information on more than 5,000 locally elected politicians. Our regression results confirm that public good provision increases in the power of the landless elite. To alleviate endogeneity concerns, we present results from 2SLS regressions that exploit natural variation in soil texture. We find evidence for two mechanisms. The first is that the landless elite faced a higher risk of strikes than the landowning elite since workers' movements were worse organized in the agricultural sector than in the other sectors. The second mechanism is that the landless elites had greater economic benefits from providing health-promoting public goods because infectious diseases were more likely to spread among industrial worker than among agricultural workers due to narrower workspaces. We also show that the relevance of these mechanisms varies for those public goods that improve the access to medical treatment and those that prevent disease outbreaks.

A potential concern about our study might be that our findings suffer from low external validity. We believe that this is not the case since the social and political situation in Prussia was similar as in other countries that industrialized in the 19th century. In particular, in most of these countries, we observe that the health infrastructure improved significantly during the late-19th/early-20th century and that the political power was distributed between an "old" landowning elite and an "emerging" landless elite. Furthermore, as pointed out by Szreter (1999) and Konteh (2009) notable similarities exist between the health developments of 19th-century Europe and today's developing countries. We are thus convinced that our

results do not only improve the knowledge about past differences in the provision of health-promoting public goods, but also help to understand present-day differences between and within developing countries. Implicitly, our findings also suggest that development policies that increase the power of workers' movements or inform local elites about the economic benefits that they have when supporting the provision of health-promoting public goods can improve the health of the poor.

From a conceptual point of view, our paper illustrates that a careful distinction between the different types of human-capital promoting public goods is important to identify the political economy mechanisms at work. Two aspects are noteworthy in this regard. First, the reasons for why the landless and the landowning elite differ in their policy preferences are different for education and health. In particular, related studies find that landowners actively block the expansion of public schooling (see Cvrcek and Zajicek, 2019, Nafziger, 2011). By contrast, our results suggest that the landowning elites consider the provision of public goods that prevent the outbreak of infectious diseases just as relatively unimportant. Furthermore, while the landless elites support public spending on education due to its productivity enhancing effects (Galor and Moav, 2006), they promote public spending on health to avoid sick leaves. The second remarkable aspect is that the motives of the elite differ for different types of health-promoting public goods. We found that landless elites actively support the provision of public goods that decrease the risk of infectious diseases. Hospitals and other healthcare facilities are mainly provided to keep the risk of strikes low.

The data that we compiled for this project complements existing data sets on Prussia (see e.g. Becker et al., 2014, Galloway, 2007), and thus opens prospects for future political economy research. From our perspective, an interesting question is which socioeconomic factors affected the distribution of political power in late-19th/early-20th century Prussia. Another pending issue is whether landless and landowning elites also take different decisions on other public goods. Finally, we think that a deeper analysis on the differences within the landless elites is important, especially in order to understand the large between-city differences in the provision of human-capital promoting public goods. For Prussia, it is very cumbersome to run such an analysis because no centralized source exists that provides information about 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 2 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 3.1).

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 2, 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 a 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 2).[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 3.1, 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 the these 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.

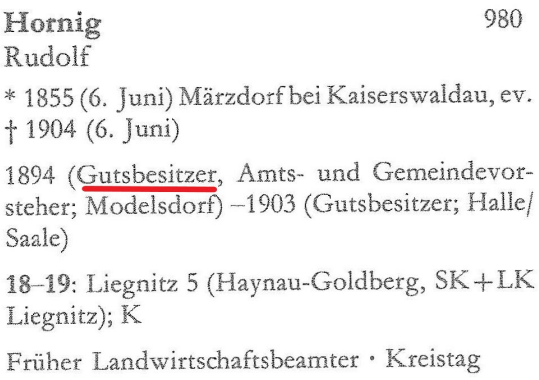
* 9. Februar 1838 Köln † 30. März 1881 Bonn-Poppelsdorf
Eltern: (zuletzt) Oberregierungsrat Johann Baptist B. († Koblenz 11.2.1895) und Josefine Elisabeth geb. Meurers
∞ am 15 .6. 1869 zu Gürath mit Anna *Sophia* Hubertina Cornelia Clemens (* Gürath 5.12.1843, ∞ am 15.6.1882 in 2. Ehe in Bonn mit dem 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)

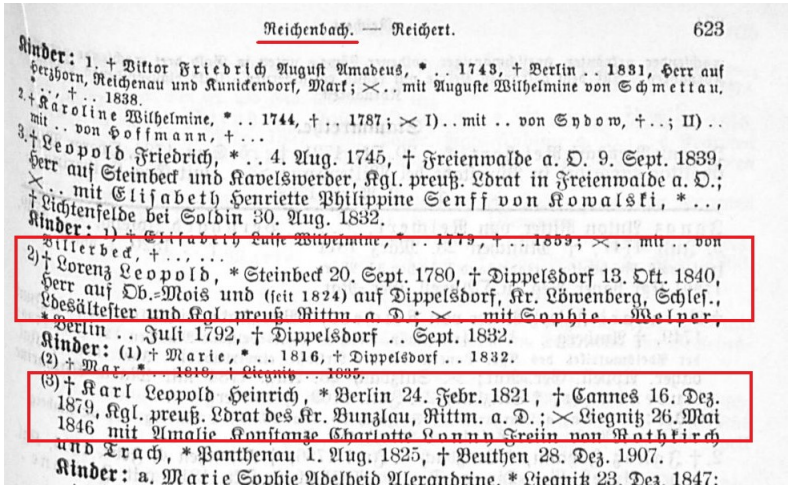
1894 (Gutsbesitzer, Amts- und Gemeindevorsteher; Modelsdorf) –1903 (Gutsbesitzer; Halle/Saale)

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

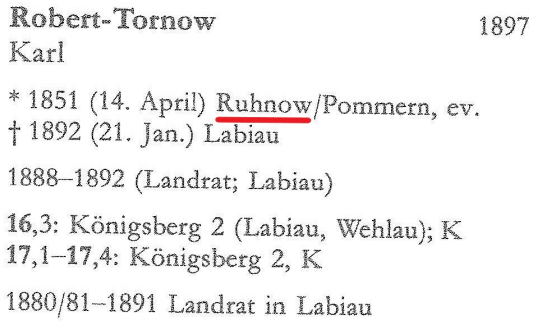


Reichenbach. — Reichert. 623

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)

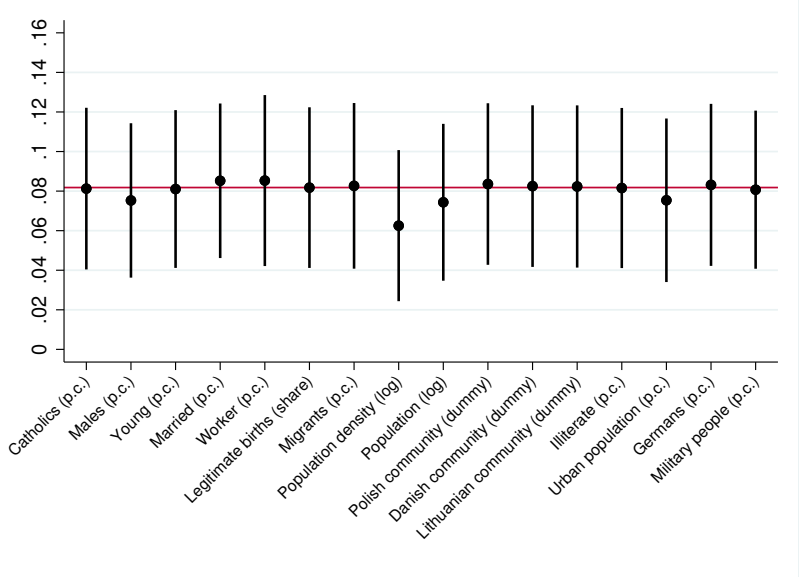
16,3: Königsberg 2 (Labiau, Wehlau); K
17,1–17,4: Königsberg 2, K

1880/81–1891 Landrat in Labiau

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

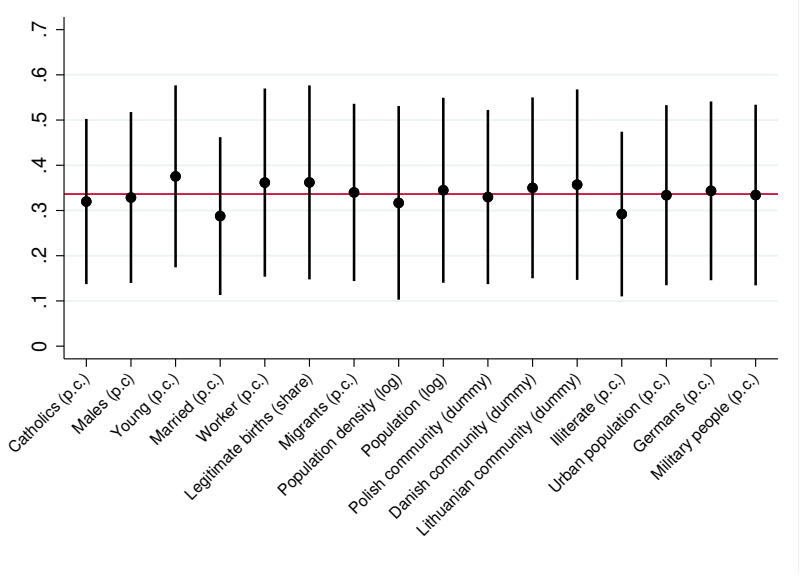
C Additional figures

Figure C.1 Jackknife analysis (Demographic controls, OLS).



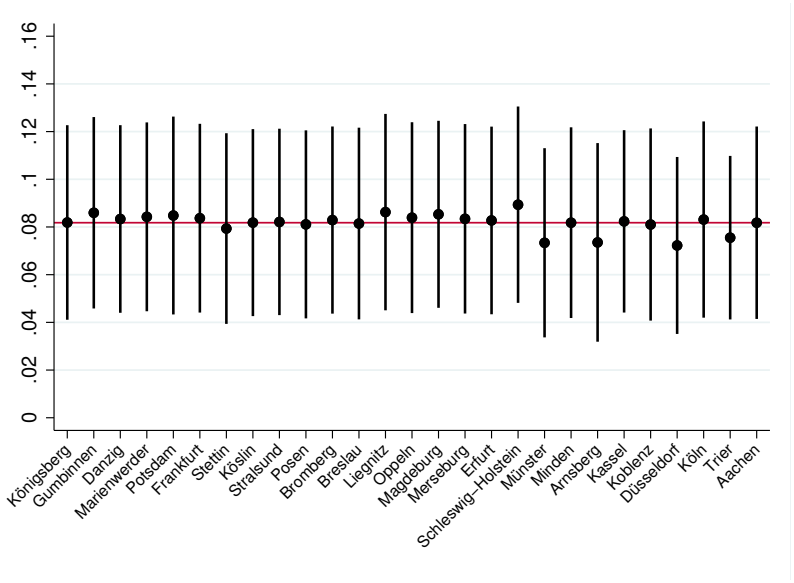
Notes: This figure presents the results of a jackknife analysis in which we separately add 16 country characteristics to the regression model used in Column 3 of Table 3. The black dots indicate the OLS estimates for our main variable of interest. The black vertical lines show the 90 percent confidence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

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



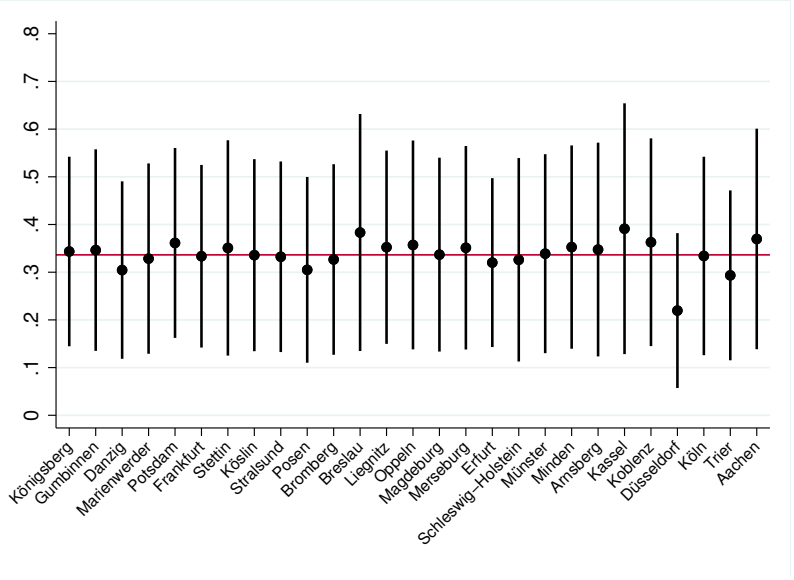
Notes: This figure presents the results of a jackknife analysis in which we separately add 16 country characteristics to the regression model used in Column 4 of Table 3. The black dots indicate the 2SLS estimates for our main variable of interest. The black vertical lines show the 90 percent confidence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

Figure C.3 Jackknife analysis (Districts, OLS).



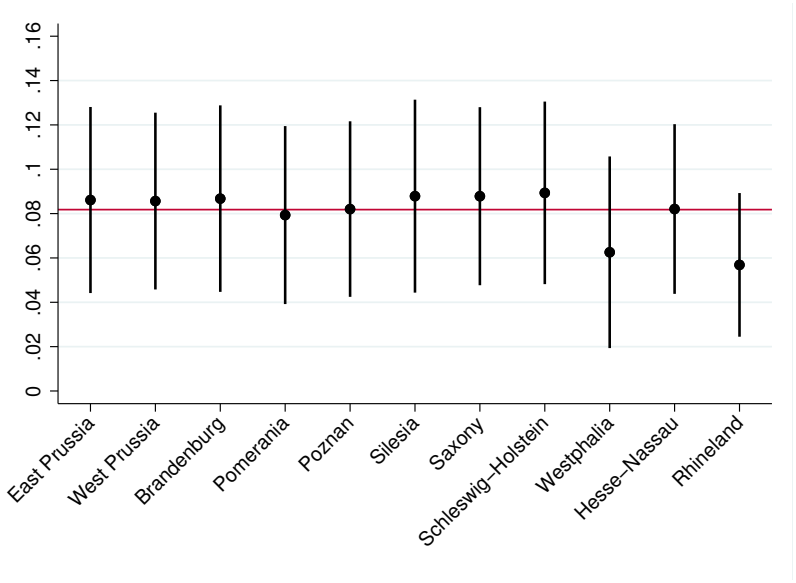
Notes: This figure presents the results of a jackknife analysis in which we consecutively exclude each district from our sample. The black dots indicate the OLS estimates for our main variable of interest. The black vertical lines show the 90 percent confidence intervals. The red horizontal line reflects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

Figure C.4 Jackknife analysis (Districts, 2SLS).



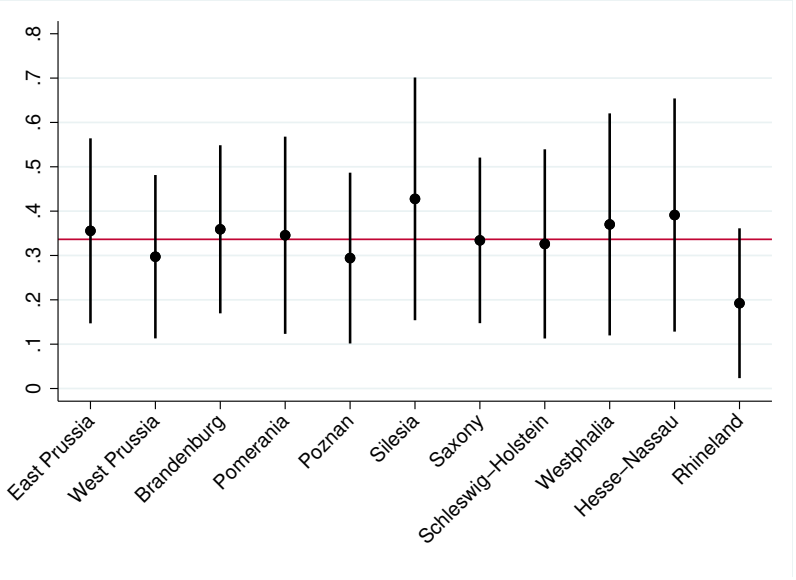
Notes: This figure presents the results of a jackknife analysis in which we consecutively exclude each district from our sample. The black dots indicate the 2SLS estimates for our main variable of interest. The black vertical lines show the 90 percent confidence intervals. The red horizontal line reflects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

Figure C.5 Jackknife analysis (Provinces, OLS).



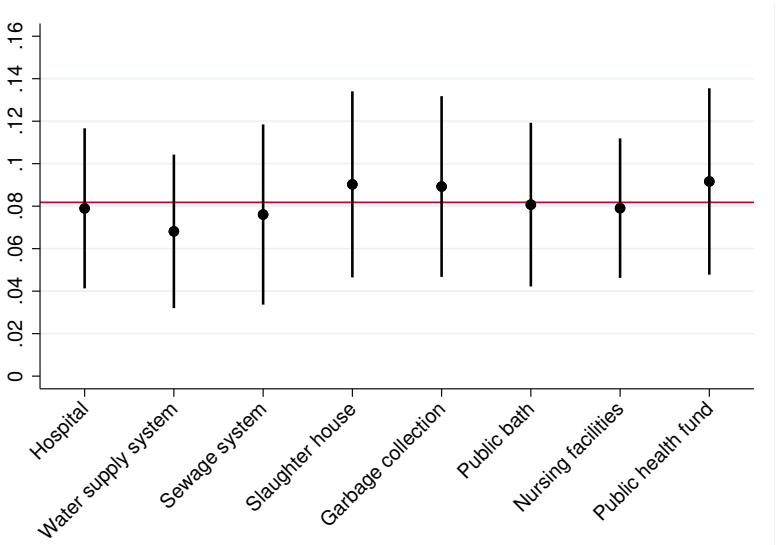
Notes: This figure presents the results of a jackknife analysis in which we consecutively exclude each province from our sample. The black dots indicate the OLS estimates for our main variable of interest. The black vertical lines show the 90 percent confidence intervals. The red horizontal line reflects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

Figure C.6 Jackknife analysis (Provinces, 2SLS).



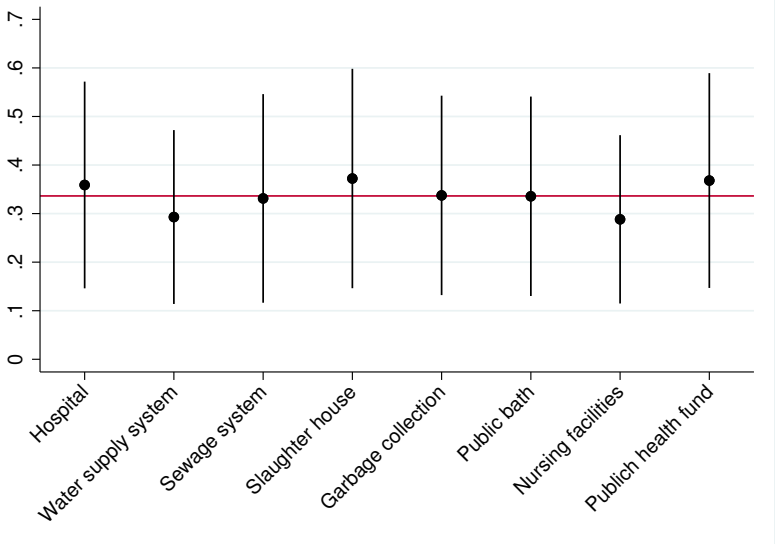
Notes: This figure presents the results of a jackknife analysis in which we consecutively exclude each province from our sample. The black dots indicate the 2SLS estimates for our main variable of interest. The black vertical lines show the 90 percent confidence intervals. The red horizontal line reflects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

Figure C.7 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.8 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 3.1.

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 3.1.
Multiplicative approach	1871 – 1911	0.4018	0.3008	See Section 3.1.
County director	1871 – 1911	0.2504	0.2835	See Section 3.1.
MP Abgeordnetenhaus	1871 – 1911	0.3909	0.2948	See Section 3.1.
MP Reichstag	1871 – 1911	0.4003	0.3330	See Section 3.1.
Additive approach	1900 – 1911	0.3779	0.2977	See Section 3.1.
Additive approach that excludes the politicians without data	1871 – 1911	0.3507	0.2479	See Section 3.1.
Panel B: Measures for the provision of health-promoting public goods				
Coverage rate (all)	1911	0.1049	0.1927	See Section 3.2
Coverage rate (access)	1911	0.1304	0.1919	See Section 3.2
Coverage rate (prevention)	1911	0.0879	0.2032	See Section 3.2
Coverage rate (urban)	1911	0.4476	0.2299	See Section 3.2
Coverage rate (rural)	1911	0.0463	0.0425	See Section 3.2
Panel C: Instrumental variable				
Share of loamy soils	Time-invariant	0.2979	0.2297	Meitzen (1869, 1894).
Panel D: 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 E: 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 F: 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 G: 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 H: 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)
Strong Workers' Movements (dummy)	1871 – 1911	0.2487	0.4328	Galloway (2007)
Ratio between employed and self-employed people	1882	8.205	30.9522	Becker et al. (2014)
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)
Power capitalist elite	1871 – 1911	0.1655	0.1668	See Section 3.1.
Power landowning elite	1871 – 1911	0.6528	0.2475	See Section 3.1.

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

Table D.6 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***			
	(0.0454)	(0.0433)	(0.0427)			
Power landless elite				-0.063***	-0.041**	-0.046***
				(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.7 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 3.2). 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.8 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 3.2). 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 Different types of health-promoting public goods (OLS and 2SLS).

	Urban municipalities		**Rural municipalities**	
	(1)	(2)	(3)	(4)
Power landless elite	0.156**	0.069	0.141**	0.681*
	(0.0672)	(0.4243)	(0.0646)	(0.3496)
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	-	0.877	-	0.041
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 3.2). 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 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 3.2). 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.11 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 3.2). 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.12 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 3.2). 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.13 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.14 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.15 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.16 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: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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 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.19. 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 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 3.1
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.

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