Extension of the Franchise and Government Expenditure on Public Goods: Evidence from Nineteenth-Century England*

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Abstract

This paper develops a model predicting that the extent of the franchise has an inverted-U-relationship with government expenditure on public goods. Extending the right to vote from the rich to the middle class leads to increased spending, but further extensions lead to declines in expenditure. This prediction is tested by constructing a dataset of town council expenditure in Britain between 1867 and 1910. The effect of franchise extension is identified by exploiting regional and temporal variation in the right to vote. The results show strong support for the theoretical prediction, with government spending highest when around 50% of the adult male population was enfranchised. *JEL* Codes: P16, N43.

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1 Introduction

There is significant evidence that government provision of sanitation infrastructure can reduce mortality rates (Zwane and Kremer, 2007). Yet investment in public goods such as clean water and sewage systems remains insufficient in many developing countries (Günther and Fink, 2011). It is often argued that democratization or increased political participation can help solve these issues, through increased support for redistribution or overcoming elite capture: most theories predict that extensions of the right to vote to the poor will be associated with increases in government expenditure (e.g., Meltzer and Richard, 1981; Lizzeri and Persico, 2004; Acemoglu and Robinson, 2000). But severe public health challenges remain even in long established democracies, and it does not appear that democratization is associated with lower mortality rates once sample selection is accounted for (Ross, 2006).

I use a new model of the extension of voting rights to argue that low investment in public goods can be explained by the opposition of the poor as well as the wealthy. In classic models of franchise extension, poorer citizens demand greater levels of redistribution, hence government spending increases once they are granted the right to vote. However, the same argument may not apply to government expenditure on public goods, since if public goods are normal goods then the poor may prefer lower taxes and *lower* government expenditure than the middle class. I show that in a framework where the poor pay taxes and governments can only spend on public goods, both the rich and the poor desire lower government expenditure than the middle class. As a result, if the right to vote is extended in order of income (from the highest to the poorest) then the relationship between the franchise and government expenditure is inverted-U-shaped: spending is highest when the middle class control government, and extending voting rights to the poor can reduce government expenditure on public goods.

To test this prediction I construct a new dataset of local government expenditure and the

extent of the local franchise in England and Wales between 1867 and 1910. Britain at this time faced demands for new public goods—such as clean water and sewer systems—similar to those required in developing countries today, and so the political obstacles they encountered are of continuing relevance. Further, the institutional structure present in Britain at this time allows a clean test of the model predictions. Decisions over spending on important local public goods and services—including streets, sewer systems, water supply and refuse collection—were made by town councils, providing variation within a common cultural and institutional environment. However, town councils did not control spending on redistributive transfer expenditure and were also legally constrained in their ability to redistribute through taxation. These facts closely match the assumptions of the model, and allow me to isolate the effects of franchise extension where governments are constrained in their ability to redistribute.

To identify the effects of extending the franchise to the poor I exploit variation in the level of the local franchise across time and across towns. I argue that, conditional on observable town characteristics, this variation was plausibly exogenous since it was a result of externally imposed national reforms and decisions by other local authorities distinct from town councils. Consequently the variation was unrelated to councils' decisions over public goods expenditure—a claim supported by the fact there is no evidence of any relationship between the parish-level choices affecting the franchise, and either earlier municipal spending or financial constraints.

The results show strong support for the inverted-U-relationship between the extent of the franchise and two main dependent variables: tax receipts per capita and public goods expenditure per capita. I first estimate the relationship semi-parametrically using the procedure of Baltagi and Li (2002), finding evidence that tax receipts and government expenditure per capita were maximized when approximately 50% of the adult male population had the right to vote. Further extensions, however, were associated with a decline in both taxation

and spending. I then test the relationship further by estimating panel regressions with linear and quadratic terms in the franchise and including time and year fixed effects. The results are robust to the inclusion of time-varying demographic controls, including potential sources of spurious correlation such as population growth, urban crowding, and the tax base per capita, as well as lagged dependent variables.

The remainder of the paper focuses specifically on the opposition of the poor to expenditure—the downward sloping portion of the inverted-U-curve. First, in Section 5.2, I use the enfranchisement of poor voters by national reforms as a treatment event in a difference-in-difference analysis. Using town-level information on the distribution of house rental value, and a poverty definition based on household budgets, I identify a group of towns where the share of the poor in the electorate increased following the reforms. The results show that, consistent with the theory, the enfranchisement of the poor led to lower public goods spending per capita.

In the penultimate section of the paper I focus on the mechanisms driving the opposition of the poor, drawing on reports of political debates in local newspapers. I collect systematic information on twenty years of council elections in one major city, Liverpool, and twenty-four local plebiscites regarding public goods expenditure. These reports demonstrate that, consistent with the model, debate over new expenditure was dominated by questions of cost and taxes, and that the poor were an important political constituency. Alternative mechanisms raised in the previous literature do not fit the historical evidence as well.

The paper concludes by discussing the implications of these findings outside the context of nineteenth-century Britain, particularly in modern developing economies. In recent years development agencies have had increasing interest in passing responsibility for key infrastructure projects—such as clean water supply—to local governments on the basis that encouraging local participation will encourage more efficient levels of investment (Bonfiglioli, 2003). Scholarly papers have investigated the role of increasing political participation and

avoiding elite capture on improving both legitimacy and the representativeness of political decisions (Chattopadhyay and Duflo, 2004; Beath and Enikolopov, 2012; Olken, 2010). The findings here suggest that such policies may lead to reductions in spending on critical sanitation infrastructure.

1.1 Related Literature

Previous authors have noted that demand for public services may be increasing in income, without discussing the possibility of an inverted-U-relationship (Husted and Kenny, 1997; Kenny, 1978). Other papers have suggested similar non-monotonic relationships with the franchise based on the characteristics of specific public goods and services, such as the potential for private provision (Epple and Romano, 1996a,b), or their value to specific occupational sectors Llavador and Oxoby (2005). The results here are more generally applicable, in that they rest on a attribute of consumption utility that applies regardless of the public good in question. Further, I show that the finding holds with progressive taxation, rather than a standard linear tax scheme, as long as all voters are required to pay some tax.

This paper is also related to a broader literature investigating why the poor do not "soak" the rich.[1] Major explanations for a lack of radical redistribution have included upward social mobility (e.g., Benabou and Ok, 2001), political institutions (e.g., Iversen and Soskice, 2006), inefficiencies from taxation, (e.g., Meltzer and Richard, 1981; Perotti, 1993), multidimensional policy spaces (e.g., Levy, 2005), and fairness norms (Scheve and Stasavage, 2016). The model in this paper shows that, in certain institutional settings, being very poor is sufficient to explain a unwillingness to raise taxes. Further, in Section 6, I argue that it is a better match with the historical context than those in the previous literature.

Empirical studies of the effects of the extension of the franchise have focused on national- or state-level expenditures, and so overlook many of the key infrastructure investments un-

[1] See Putterman (1997) and Alesina et al. (2001) for overviews.

dertaken at city- or town-level. This limitation has led to a focus on redistributive government expenditure (e.g., Husted and Kenny, 1997; Lott and Kenny, 1999; Aidt et al., 2006; Aidt and Dallal, 2008; Abrams and Settle, 1999; Lindert, 2004) or nationally-funded education services (e.g., Stasavage, 2005; Brown and Hunter, 2004; Baum and Lake, 2003). The evidence that is available does not identify a clear cut effect of franchise extension on the provision of public goods. Female enfranchisement had no effect on investment in sanitation infrastructure between 1905 and 1930, although this may reflect the fact that by this point large towns had already invested in these public goods (Miller, 2008). More generally, there is evidence that poorer citizens sometimes oppose government expenditure (Brown, 1988; Harding and Stasavage, 2014; Bursztyn, 2016).

Two previous papers have focused on the effect of local democratic reform in nineteenth-century Britain. Drawing on the model in this paper, Chapman (2018) shows that an 1894 reform reduced the rate of investment in new infrastructure, particularly where local elites were predominantly middle class. Aidt et al. (2010), using a subset of the data in this paper, find evidence of a "retrenchment" effect, whereby the middle class opposed expenditure on public goods. The results here differ as a result of utilizing a larger, more comprehensive dataset encompassing information from a broader range of accounts and hence more accurate measures of town council spending.[2] I introduce that dataset in detail in Section 3, but first I introduce the theoretical model underpinning the empirical predictions.

[2]Specifically, I take account of additional expenditure before major extensions of the franchise in 1869 by including the spending by town councils as "Improvement Commissions". I also benefit from a much broader and longer panel dataset, as a result of collecting additional data relating to the municipal franchise.

2 Model

This section presents a simple model in which the poor and the rich desire lower government expenditure on public goods than the middle class. Consequently, if the franchise is extended first to the rich, then to the middle class, and then to the poor, the relationship between municipal expenditure and the extent of the franchise is inverted-U-shaped. This prediction results from assumptions relating to the shape of citizens' utility functions, particularly the fact that the poor have a relatively high marginal utility of consumption. Those assumptions are particularly plausible in a low income economy, where poorer citizens may struggle to pay for a sufficient food intake. The rich, on the other hand, oppose higher tax rates because they face a relatively high tax burden.

Government spending in the model is limited to the provision of public goods, and all citizens have to pay tax. For exposition purposes, in the main text this is implemented through a linear tax rate but, as shown in Appendix A.1, the results hold when extending the model to incorporate progressive taxation.[3] Consequently, the model has implications for any setting in which the poorest bear some of the burden of paying for public goods.

Consider an individual i who receives utility from private consumption and from expenditure on a local public good G. Utility from the public good is dependent on the per capita level of expenditure $g = \frac{G}{N}$, where N is the town population.[4] Individuals receive an income y_i, with aggregate income denoted by Y. The tax rate and government spending are set through a standard two-candidate simple majority election, in which candidates' promises are binding.

A critical assumption in the model is that all citizens pay the taxes that fund the public good. For exposition purposes, in the main text this is implemented through a linear tax

[3]Specifically, I consider a tax system which is progressive in the sense that, for some y_i, the tax elasticity $\epsilon(y_i) = \frac{t'(y_i)}{t(y_i)} y_i > 1$. In addition, I assume marginal tax rates are between 0 and 1, and are weakly increasing.

[4]This assumption reflects the fact that, for instance, a fixed investment in clean water supply may only be able to serve a certain number of citizens.

rate $\tau \in [0,1]$, leading to a government budget constraint of $G = \tau Y$.

As such, the utility of individual i is given by:

$$U_i = u(c_i) + v\left(g\right)$$

Assume u and v are strictly concave, twice continuously differentiable, $\lim_{x\to 0} u'(x) = \lim_{x\to 0} v'(x) = \infty$ and that the returns to the public good are exhausted at some point: that is, there is some $\hat{G} < Y$ such that $v'\left(\frac{\hat{G}}{N}\right) = 0$.

In addition, assume the following conditions on the coefficient of relative risk aversion for $u(c)$, $r_R(c,u) = -c\frac{u''(c)}{u'(c)}$.

1. $\frac{\partial r_R(c,u)}{\partial c} < 0$.

2. $\lim_{c\to 0} r_R(c,u) > 1$ and $\lim_{c\to\infty} r_R(c,u) < 1$.

These assumptions state, essentially, that poor individuals are very sensitive to reductions in consumption, but that this is less true of the wealthy. Intuitively, poor households may be unwilling to gamble, since any loss means more to them. Ogaki and Zhang (2001) provide evidence that this form of utility is appropriate in modern-day developing societies with low income households.[5]

These assumptions are sufficient to give the following proposition:[6]

Proposition 1. *Denote g_i^* as the optimal level of government public goods expenditure per capita for an individual with income y_i. Then there exists $\tilde{y}$ such that:*

[5]One type of utility function that meets these conditions is a subset of Hyperbolic Absolute Risk Aversion (HARA) models (Merton, 1971). In particular, if:

$$u(c_i) = \frac{1-\gamma}{\gamma}\left(\frac{\beta c_i}{(1-\gamma)} - \underline{s}\right)^{\gamma}$$

then the conditions are satisfied for $\underline{s} > 0$ and $0 < \gamma < 1$. Here $\underline{s} \geq 0$ can be interpreted as a subsistence level of consumption from which individuals receive no utility (that is below this level they are essentially unable to meet their basic needs).

[6]All proofs are contained in Appendix A.

1. $\frac{\partial g_i^*}{dy_i} \geq 0$ *for* $y_i \leq \tilde{y}$

2. $\frac{\partial g_i^*}{dy_i} < 0$ *for* $y_i > \tilde{y}$

This proposition states that the optimal tax rate is inverted-U-shaped in income: the rich and poor desire lower government spending per capita compared with those with medium levels of income. The preferred level of spending is increasing in income until a point, $\tilde{y}$, after which the preferred amount of spending decreases in income. Intuitively, this is because at low levels of income citizens cannot "afford" spending on the public good, since an increase in taxation moves them to very low levels of disposable income. As income rises, this cost is reduced, increasing the preferred tax rate. However, at the same time, the marginal cost of taxation increases since richer citizens have a greater income to be taxed. Thus eventually demand for per capita public expenditure declines.

The next proposition translates these preferences into the level of spending implemented by the government. Denote the most limited (that is the initial) electorate as E_0 and suppose the right to vote is extended sequentially in decreasing order of income: i.e., a citizen i is only enfranchised once all citizens with $y_j > y_i$ are already enfranchised. Further, assume that the distribution of income in the town is such that $y_i \neq y_j$ for $i \neq j$, $|\{i|y_i \geq \tilde{y},\ i \notin E_0\}| \geq 2$ and $|\{i|y_i < \tilde{y},\ \tau_i < \tilde{\tau}\}| \geq 2$, where $\tilde{\tau}$ denotes the median level of τ_i^* for all individuals for whom $y_i \geq \tilde{y}$ (the decreasing part of the optimal tax function). These latter assumptions ensure that the median voter in the initial electorate is sufficiently wealthy, and that there some individuals sufficiently poor to want a lower tax rate than the rich. Finally, assume that N and E_0 are odd.

The key testable implication for the empirical analysis is then given by the following proposition.

Proposition 2. *The tax revenue and amount of government spending per capita will be inverted-U-shaped in the level of the franchise.*

This proposition states that, under assumptions regarding the composition of the electorate, extensions of the franchise will initially lead to higher public goods spending and taxation but then, eventually, lower levels of spending on the public good.

The empirical analysis in Section 5 tests this proposition in the context of nineteenth-century Britain. The next two sections explain that historical context, introduce the dataset used in that analysis, and discuss the sources of variation in the local franchise that underpin the identification strategy.

3 Data

I test the existence of the inverted-U-relationship using a new dataset of town expenditure and the extent of the franchise in England and Wales between 1867 and 1900. This section starts by discussing the historical context, and explains how the constraints on local governments closely follow the assumptions of the model. I then introduce the dataset and main variable definitions used in the empirical analysis.

3.1 Institutional Context

The councils of incorporated towns ("municipal boroughs") during the nineteenth century were all locally elected but, critically for our analysis, varied in the extent of the franchise—variation I discuss in detail in the following section.[7] A combination of local and national factors led to extensive variation in the proportion of the adult population holding the right to vote in different towns.

Town councils faced tight legal constraints over the types of spending they could undertake, and the types of taxes they could levy. Their spending was largely limited to spending on infrastructure and other public goods. For most of the period of the empirical analysis, much of this spending was associated with sanitation—including water supply, sewer systems and paving or cleaning of streets. Later on, in the 1890s, this role expanded to include electricity supply and tram systems. Importantly, however, municipal councils did *not* have authority to undertake transfer payments and did not control spending on either welfare (that is poor relief) or on education.[8] This framework then closely matches the assumptions of the model.

[7]The councils were locally elected from the 1835 Municipal Corporations Act onward. Interested readers are referred to the Appendix B for the discussion of other specific Acts that affected the municipal franchise: for the sake of brevity I refer to most legislative changes only by the dates when they occurred.

[8]Welfare expenditure was controlled by Boards of Poor Law Guardians. Education spending was determined by local school boards.

The need to improve urban environments was a major source of political debate following the Industrial Revolution. From the 1840s onward, reacting to squalid urban environments—famous even now, due to the work of Dickens and Engels—sanitary reformers pressed for greater government intervention to improve public health. Yet despite the sanitary benefits of these investments, the reformers' progress was often stymied by taxpayer opposition to new expenditure that would dramatically increase their tax burden (Hennock, 1973, 1963; Wohl, 1983). Consequently, sanitary conditions remained extremely poor: in Manchester and Liverpool mortality in the decade 1895-1904 was 10% higher than that in New York (Lampard, 1973). Many had to endure truly appalling conditions, as summed up by a contemporary health observer at the *end* of the nineteenth century:

> "...children, even of respectable parents, were encouraged to make a convenience of the open street, if not of the kitchen floor...I have seen without enthusiasm, both earth closets and middens where pails were used ...and the flies that bred in and swarmed around these filthy places also settled thickly about the eyes of the babies in the wretched little houses, whose front doors opened within a few feet of these insanitary conveniences." (Quoted in Thompson, 1984, p.141)

How could there be continued opposition to increased government expenditure in the light of such conditions? Critically, towns had to raise their own funds to pay for new expenditure, with no recourse to grants from central government. Councils also faced restrictions on the type of taxes they could impose. Tax raising power was limited to taxes on property, and was restricted to a single proportional rate—there was no possibility of a progressive tax rate. Nor was it is possible to impose other taxes, such as business or income taxation, that could have led to a more progressive schedule. Further, taxes fell on all property occupiers, rather than just owners; tax thus became extremely salient in local elections.

This tax structure ties closely to the theoretical assumption of a proportional tax rate, if spending on housing as percent of income was similar across income groups. One complication not considered in the model, however, is whether the full value of taxation was

passed onto tenants and not absorbed by landlords through lower rents. The historical evidence about the incidence of taxation is somewhat mixed (for instance, see the discussion in *Hansard*, 20 February 1850 col 1118-27). However, for the purposes of the theoretical prediction, it is sufficient that part of the cost was passed on to tenants since the model extends to a situation of progressive (or regressive) taxation.

Taxation and the right to vote were tightly connected in nineteenth century England, providing a further parallel between the historical context and the model. Non-payment of taxes disqualified a citizen from voting, meaning that all tax-payers were also voters. One complication, discussed in detail in Section 4, is that some extensions of the franchise were a result of taxing poor renters for the first time: meaning the tax base and the franchise moved together (whereas in the model they are independent). In principle, the growing resource could counteract the opposition of the poor to greater spending. In practice, however, this does not appear to have been important: the increase in the tax base following such enfranchisements was "generally but a small, often an insignificant fraction" of the total value (House of Lords, 1859, p.v). Further, the empirical results are unchanged when controlling for the size of the town tax base.

3.2 Data Sources and Variable Definition

I now provide an overview of the sample and variables used in the empirical analysis. A more detailed discussion is provided in Appendix B. Table I summarizes the variables used in the regression analysis.

Sample The analysis focuses on towns that were both incorporated and had control of sanitary expenditure in 1867 (i.e., the start of the study period). The group of incorporated towns in England included nearly all the largest towns in the country: the major exception was London which was governed under its own set of councils. However, it also included a number of small market towns, due to historical charters obtained prior to the Industrial

Table I: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Male Franchise (% Adult Male Population)	4856	55.81	11.5	20.77	80.18
Total Public Goods Spending per Capita (£ p.c.)	4856	.57	.39	0	3.03
Sanitation Spending per Capita (£ p.c.)	4181	.29	.19	0	1.75
Tax Receipts per Capita (£ p.c.)	4856	.57	.31	0	2.06
Property Receipts per Capita (£p.c.)	4221	.09	.15	0	2.04
Population (10,000s)	4856	4.85	8.04	.1	67.92
Crowding (Population/Houses)	4856	5.19	.89	3.86	11.37
Annual Population Growth (%)	4856	.97	1.11	-2.29	7.61
Female Franchise (% Women over 30)	4856	10.14	5.49	0	28.79
Tax Base per Capita (£ p.c.)	4786	3.91	1.38	.12	9.69
% Population In Agriculture	4823	15.45	12.71	.51	50.83
% Population In Commerce/Professions	4823	5.64	1.69	2.24	14.09
% Men over 20 Heads of Household	4844	35.85	2.22	27.92	42.56

Note: The table presents summary statistics for the variables included in the regression analysis in Section 5. See text and Appendix B for data sources and variable construction.

Revolution. A total of 214 towns had been incorporated by 1867; however only 154 had control of sanitary expenditure prior to this date. A further four towns are excluded due to either franchise data that appeared implausibly high (above 90% in some cases) or (in one case) because of difficulties identifying boundary changes. The remaining 150 towns include 92% of the 1881 population of the 214 municipal boroughs incorporated by 1867. Further, they include all towns with population above 100,000 in 1881, and 35 of 41 towns with population above 50,000 in 1881.[9]

The Extent of the Franchise My measure of the franchise is the *male* franchise, since the key prediction of the model relates to the extension of voting rights to poorer citizens. This is important since using the total franchise could conflate two (potentially very different)

[9]These figures exclude West Ham and Croydon, which became London Boroughs at a later date.

sources of changes in the franchise: the broadening of the male franchise, and the extension (for the first time) of the franchise to women. As discussed in detail in Section 4, it is reasonable to assume that growth in the male franchise involves extensions of the right to vote to poorer citizens. However, this is not necessarily the case for women, since their right to vote depended on being a head of household, and it is not clear how the preponderance of female household heads may have varied across income groups.

I measure the level of municipal franchise for each sex as follows:

$$\text{Male (female) franchise} = \frac{\text{Number of male (female) electors}}{\text{Male (female) population of voting age}}$$

The numerator of the measure is calculated using the number, and gender breakdown, of municipal electors reported in a number of parliamentary papers for ten cross sections between 1864 and 1897. The franchise in intervening years is interpolated using a compound average growth rate. The denominator is calculated using total male and female municipal population collected from decennial censuses, adjusted by the estimated proportion of male and female citizens of voting age, using information from the 1881 census.

To account for potential delays between the date of registration and actual change in expenditure, I use the value of the franchise lagged by three years. This time lag is chosen to reflect the fact that municipal councils were elected across a three year period; the results, however, are robust to different lag periods (including no lags). To ensure that the results are not driven exclusively by the tails of the franchise distribution, I also exclude the top and bottom 1% of franchise values. The results are, if anything, stronger when including these observations—see Appendix E.

Financial Data The analysis uses a new annual panel dataset for the years 1867 to 1910.[10]

[10]Since data on the franchise is unavailable after 1900, financial data for the years 1901–1910 is used only to estimate the ongoing expenditure measure discussed below and is not used in the main regressions (the year 1901 is used when aggregating the data into five year periods in the analysis in Table IV).

The dataset was constructed from the *Local Taxation Returns* contained in the Parliamentary Papers collection. These financial accounts detail the sources of revenue and types of expenditure in each town. Financial values are then translated into constant values using the Rousseaux Price Index (Mitchell, 1971, pp. 723-4) following Millward and Sheard (1995).

I construct three measures of government revenue and expenditure: tax revenue per capita and two measures of public goods expenditure. The first includes all public goods expenditure. This has the advantage of being available for the whole period from 1867 onwards—expenditure was not generally disaggregated before 1872. After 1890 some street expenditure was financed by transfers from the newly reformed County Councils and, as such, this is subtracted from overall street expenditure.

One concern is that the financial accounts do not differentiate between investment and ongoing (e.g., maintenance) expenditure on public goods. As a result, it is clear from inspection of the dataset that there are a large number of extremely high one time expenditures (see Appendix Figure A.IV). To deal with this issue, I construct a measure of ongoing expenditure. To separate ongoing expenditure from investment expenditure, I first identify "investment periods" by analyzing deviations in trend expenditure for each type of expenditure. In non-investment periods, the level of ongoing expenditure is simply the per capita expenditure in that period. In investment periods, the level of ongoing expenditure is the level of expenditure in the next non-investment period. For instance, if 1873 and 1874 were investment periods, but 1875 was not, then the level of per capita expenditure in 1873 and 1874 is set equal to that in 1875.

Investment periods are identified using both the level and year-on-year increase in expenditure.[11] An investment period is identified as starting either when a town begins spending

[11] Appendix B.2 contains full details of the methodology used to identify investment periods, and plots the unadjusted versus the adjusted spending data. An alternative approach is to simply remove the observations with very high values from the analysis as outliers. There is still strong support for the inverted-U-relationship, for instance, when excluding the highest 1% or 5% of observations of expenditure per capita on public goods in year. However this approach has the difficulty that it may be biased against towns with

for the first time, when year-on-year expenditure increases by more than 100%, or if the town's per capita expenditure is higher than twice the median of per capita expenditure in the town in future years. An investment period is then identified as continuing until expenditure falls significantly again, relatively both to other towns and future expenditure in the same town. Prior to the existence of disaggregated data in 1872, investment periods are also identified if expenditure is more than twice the aggregated 1872 ongoing expenditure. The results are robust to alternative ways of identifying these periods.

The accounts also report the size of the tax base—the aggregate "rateable" value of property in the district—in each town. Data are available (almost) annually from 1872 onwards, and also for 1866 and 1870: values for missing years are interpolated linearly.

Census Data Information regarding the population and number of inhabited houses for each town were gathered from census reports between 1861 and 1901, and from the parish-level statistics for the 1911 census gathered by Southall et al. (2004).[12] I interpolate between these census years to create an annual data series.

I construct three demographic variables using this information: a categorical population measure, "urban crowding": defined as (population/number of houses), and population growth. In addition to these variables, I also include information regarding the occupational structure, and the percentage of men that were household heads in the town using data from 100% census samples—see Appendix B.4 for more details.

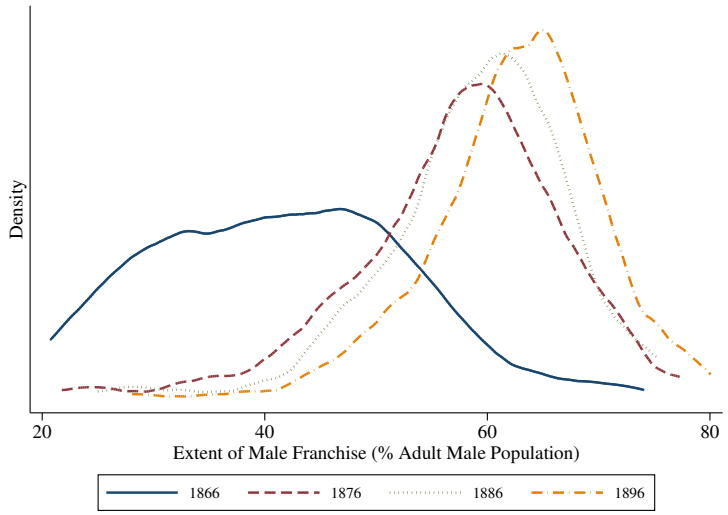
generally high expenditure, and may lead to bias by excluding periods when important expenditure occurred.

[12] An "inhabited house" in this context was defined as a distinct building which was inhabited, including "all space within the external and party walls of a building" (Newman, 1971, p.11).

4 Variation in the Extent of the Franchise

The extent of the franchise varied considerably across towns and across time, as we can see in Figure I. This section starts by discussing the regulations that determined that variation, and a series of major national reforms that caused large expansions in the franchise over time. In particular, the regulations mean that the variation in the level of the franchise reflects differences in the extent to which the poor were able to vote—an important assumption of the model. I then analyze the sources of the cross-sectional variation in voting rights, providing historical and quantitative evidence that franchise decisions were made independently of municipal concerns. Consequently, the franchise variation is plausibly exogenous to the decisions over town spending analyzed in the following section.

Figure I: The extent of the franchise varied over time and within individual cross-sections.



Note: The large expansion of the franchise due to the 1869 reforms is clear from the rightward shift in the distribution between 1866 and 1876. The width of the distribution also decreases, due to the reforms standardizing the franchise regulations across towns. Further increases then occurred as a result of legislation in 1878, 1882, and 1888 that consolidated these 1869 changes. For details of variable construction, see Section 3 and Appendix B.

At the beginning of our period, the municipal franchise was extended to male heads of household that met three major conditions.[13] First, they had to have been resident in or near the town for a period of three years prior to each election. Second, they must have paid all local taxes for the previous two and a half years and, third, they could not have received poor relief in the previous year.[14] A series of national reforms lightened these restrictions and, as result, caused significant expansions of the franchise: the median level of the franchise increased by almost 20% of the adult male population between 1866 and 1885.[15]

The largest increases resulted from a set of reforms in 1869 which enshrined the right of tenants to vote even when paying their taxes indirectly through their landlord. Second, the reforms significantly reduced both the length of residence and tax-paying requirements by two years. At the same time women also gained the right to vote, although the restriction to heads of household meant that they remained a small proportion of the electorate. Further reforms, clarifying and consolidating the 1869 changes, then led to further expansions. These national reforms were motivated not by concerns in any particular town, but were rather a follow-on to changes in the Parliamentary franchise. As such they provide shocks to the level of the franchise that are exogenous to municipal concerns.

The tax-paying requirement was the major source of disenfranchisement during our period (Keith-Lucas, 1952, p.66–69). Collecting taxes directly from occupiers of low value accommodation could be prohibitively expensive, meaning that such occupiers were often not taxed—and hence were unable to vote. In some areas, tax collectors collected taxes from landlords on behalf of their tenants, often in return for a discount of around 25%—a practice known as "compounding". However, taxes could only be collected in this way if

[13]The historical discussion in this section draws heavily on Keith-Lucas (1952), especially pp.66–74.

[14]These restrictions differed from those governing the right to vote in Parliamentary election, particularly in not imposing any minimum threshold for property occupation. See Appendix C.2 for details.

[15]The right to vote was only given to heads of households, and so these figures indicate that by the 1880s a very high proportion of households had the right to vote in these towns. This also explains the comparatively low level of the female franchise since, in 1881, fewer than 7% of adult women were heads of household.

parishes obtained the authority to do so under an Act of Parliament—leading to variation across (and within) towns in both whether and how compounding was practiced and, even if was, whether these so-called "compounders" then had the right to vote. The 1869 and later reforms reduced this variation by both allowing compounding everywhere, and clarifying that compounders did, indeed, have the right to vote.

The fact that it was poor renters that were disenfranchised by the regulations is important, as it means that the historical context meets the theoretical assumption that the franchise would be extended in descending order of income.[16] Appendix D.1 provides quantitative support for this claim, showing that the pre-reform franchise was lower where those with the right to vote in Parliamentary elections (who were generally wealthier) were over-represented in the electorate. In addition, regressions show that the franchise was higher in towns with a higher percentage of compounders in the electorate before 1869. The change in the franchise following the 1869 reforms was, in contrast, lower in those towns—evidence that the reforms enfranchised poor renters.

The variation in whether compounding occurred—and hence poor renters enfranchised—is plausibly exogenous to town spending for three reasons. First, it was parish authorities, rather than town councils, making decisions over whether and how to adopt relevant legislation. Second, the precise legislative mechanism used to enable compounding affected the franchise in ways that could not have been predicted when making adoption decisions. Third, poorly worded national legislation meant continued uncertainty even after legislation was adopted locally. I first explicate each of these points, and then directly test whether parishes' decision to adopt compounding is correlated with municipal characteristics.

Crucially, decisions over adopting the additional powers were made by parish authorities rather than municipal councils. Parishes were small geographic units, with boundaries that

[16]The long residence requirements would also fall more heavily on poorer citizens, who would move more often and not be tracked by parish officials (House of Commons, 1878, para 2204).

differed considerably from the towns making spending decisions. There were generally several parishes within a town, and parishes often fell only partly within a town boundary.[17] Parish responsibilities in this period consisted largely of managing the collection of taxes for both municipal and poor relief purposes, and parish officials decided who was rated for taxation, and how taxation was collected.[18] It was thus parishes that could seek, and be granted, the right to compound.

Significant variation in the adoption of compounding emerged after the 1850 Small Tenements Rating Act (henceforth STRA). Prior to 1850, obtaining the right to engage in compounding required parishes to obtain a Local Act of Parliament—a costly and difficult process. The STRA, in contrast, allowed parishes to simply opt-in to these powers, but included a clause ensuring that the compounders would obtain the franchise. Many parishes chose to adopt the Act, and in doing so saw large increases in the expansion of the municipal franchise—across towns where it was (at least partially) adopted the electorate grew from 101,338 to 254,118 by 1866 (Keith-Lucas, 1952, p.67). The take-up of this act is thus critical to the variation in the franchise before 1866.

Historical evidence indicates that parishes did not consider the effect on the municipal franchise when making decisions over adopting the STRA. An 1859 Select Committee commented that "as it bestows no parochial votes on the tenement holders, it is not surprising that the vestries should look at the question of its adoption merely in a financial point of view"(House of Lords, 1859, p.vii). Further, different parishes *within* a town varied in their decisions over the STRA, indicating that municipal concerns were at most only one factor

[17]Only 22% of towns were comprised of a single complete parish in 1871, with almost 50% containing more than 3 parishes. Several towns contained over twenty parishes. Calculations using House of Commons (1872a).

[18]Historically parishes played a role in determining poor relief; however after the 1834 New Poor Law decision-making power was passed to Boards of Guardians that governed multiple parishes. However, even though they no longer controlled the level of tax, they were still responsible for rating and tax collection. As such, parishes generally decided whether to seek the power to compound, although there were a small number of exceptions, whereby town councils included compounding as part of Corporation Acts.

in the decision over adoption. Within a sample of 85 towns, only 33% had adopted the Act within all of their parishes, whereas 47% had adopted it within some parishes.[19] Finally, Parliament itself failed to anticipate the significant effect the STRA had on the franchise (Keith-Lucas, 1952).

Further, the extent to which the adoption of compounding would affect voting rights was unpredictable in advance. The legal position of compounders was ambiguous, and apart from the STRA, legislation did not make it clear whether paying rates indirectly qualified tenants to vote. Local authorities turned to the courts, who could come to differing decisions over similar questions in different parts of the country. Even after the 1869 reforms seemingly confirmed that compounders had the right to vote, it remained legally questionable whether this applied regardless of the legislation under which compounding was authorized, and lawyers continued to fight over the issue at least into the 1870s (Keith-Lucas, 1952, p.74). The effect on the franchise was thus determined by the interaction between the initial legislation enabling compounding, poorly worded national legislation (potentially decades later), and the decisions of local justices—all plausibly exogenous to town council decisions.

There could, of course, be threats to exogoneity even if parish-level authorities were motivated purely by financial concerns. Reverse causality is possible if parishes were motivated to adopt the STRA in response to the burden of municipal spending. Alternatively, parish decision-making may have reflected some local characteristic, such as the local tax base or density of poor renters, that could also affect municipal spending. Both concerns are mitigated somewhat by the differences between municipal and parish boundaries, and the fact that poor relief was a much bigger financial burden for parishes than municipal spending at this time.[20] However, we can also test the importance of municipal-level issues directly by

[19] Figures based on data from House of Commons (1866). The sample consists of towns consisting of multiple parishes with coterminous Parliamentary and municipal boundaries in 1866.

[20] Across England and Wales in 1857, non-poor law bodies accounted for approximately 22% of the revenue raised by parishes. Across fourteen Poor Law Unions identified as being part of Britain's biggest cities by Szreter (2005), the percentage was 24%.

examining the adoption of the STRA at parish-level.

The evidence in Table II supports the claim that parishes were not motivated by municipal concerns when deciding whether to adopt the STRA. Here I analyze the take-up of the Act across all parishes in towns represented in Parliament—most, but not all, of which were also represented in Parliament. I first simply consider whether we see different patterns of adoption in parishes within municipal boundaries, and then test directly whether adoption is associated with either the pre-STRA burden of municipal spending,[21] or two municipal characteristics that could be correlated with spending: occupational structure or the tax base per capita.

None of the six specifications suggest that adoption of the STRA was influenced by municipal factors. As discussed above, the STRA enfranchised compounders for municipal, but not other, elections; thus we would expect a different adoption pattern if the STRA's effect on the franchise was an important concern for parishes. There is no evidence of such an effect: the coefficient regarding being within a municipal boundary is statistically insignificant and close to zero both across the whole sample (specifications 1 and 2), and when focusing on the variation within towns where the parliamentary and municipal boundaries differed (specifications 3 and 4). Further, specifications 5 and 6 show no evidence that the willingness to take-up the STRA was unaffected by the burden of municipal spending, or town characteristics associated with the demand for public goods. These key parish-level enfranchisement decisions are not correlated with town-level factors.

Appendix D.1 presents similar results when estimating regressions at town-level. Again, there is no evidence that either early town spending or the size of the tax base are correlated with the pre-reform level of the franchise, or the change in the franchise due to the reforms. Further, there is no evidence that the pre-reform party of the town mayor—who

[21]The level of town expenditure here includes only municipal spending accounts, and so may miss some additional expenditure. However, this is less of a concern for these earlier years since prior to the 1848 Public Health Act it was considerably more difficult for councils to invest through these other bodies.

was responsible for overseeing elections—had any effect on the change in the level of the franchise, providing reassurance that officials could not control the effects of the reforms on the franchise.

Table II: Parish decisions affecting franchise were independent of town characteristics.

	DV = Implemented Small Tenements Rating Act					
	(1)	(2)	(3)	(4)	(5)	(6)
Within MB boundary	-0.01	-0.03	-0.04	0.00		
	(0.071)	(0.071)	(0.084)	(0.056)		
Parish Population (Log)		0.06*	0.09*	0.12**		0.15***
		(0.032)	(0.052)	(0.057)		(0.042)
Parish Popn <100		-0.14*	0.04	0.01		-0.09
		(0.073)	(0.099)	(0.076)		(0.121)
Parish Crowding		-0.02*	0.01	0.00		-0.01
		(0.012)	(0.014)	(0.005)		(0.012)
Town Spend p.c. pre-STRA					0.01	0.02
					(0.042)	(0.037)
Town Tax Base p.c. pre-STRA					-0.03	-0.01
					(0.048)	(0.044)
Town % Agricultural					-0.03	-0.05
					(0.082)	(0.073)
Town Population (Log)					-0.09	-0.16**
					(0.065)	(0.062)
Sample	All	All	Different Bounds	Different Bounds	MBs Only	MBs Only
No. Observations	1369	1369	419	419	702	702
No. Towns	282	282	97	97	141	141
R^2	0.00	0.04	0.02	0.49	0.02	0.12
Town Fixed Effects	N	N	N	Y	N	N

The unit of observation in this table is parish, with the dependent variable equaling one if the parish chose to implement the Small Tenements Rating Act. "All" includes parishes in all parliamentary boroughs, while "different boundaries" includes only boroughs with differing municipal and parliamentary boundaries. "MBs only" excludes parishes in parliamentary boroughs which were not also municipal boroughs. Coefficients for all continuous variables are standardized. Standard errors are presented in parentheses and clustered by town. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

These results offer considerable reassurance that the variation in the franchise is plausibly exogenous to town decisions. In the next section I thus turn to testing the existence of an inverted-U-shaped relationship with government expenditure on public goods.

5 Empirical Results

This section tests of the key hypothesis of the model: that the relationship between the extent of the franchise and per capita expenditure on public goods is inverted-U-shaped. Semi-parametric plots show clear evidence that the relationship has the shape predicted by the model; a finding robustly supported by panel regressions with fixed effects. The second subsection uses national reforms as an exogenous shock to the franchise, and shows that towns where poor citizens were enfranchised saw lower growth in public goods spending.

5.1 Tests of the Inverted-U-Relationship

I start by allowing a flexible relationship between the franchise and the size of government, while assuming a linear relationship with other town characteristics. That is, I estimate the following specification:

$$y_{i,t} = \alpha + g(franchise_{i,t}) + \beta X_{i,t} + \gamma_0 Z_i + \delta T_t + \epsilon_{i,t} \tag{1}$$

where i indexes towns, t indexes year, $g(\cdot)$ is a function to be estimated, and ϵ is an error term. Dependent variables include total public goods expenditure per capita, total tax revenue per capita, and sanitation expenditure per capita. As the latter is only available from 1872 onwards, some specifications focus only on the first two variables. I also include placebo tests using the total property receipts per capita, as explained in more detail below. X is a vector of town-specific time-varying controls; Z and T refer to town- and year-fixed effects respectively.

The effect of extending the franchise is identified based on the assumption that the variation in the franchise is exogenous conditional on four observable characteristics. As discussed in the previous section, cross-sectional differences in the extent of the franchise were a result of parish-level (not town council) decision-making and legal ambiguities, while

changes in voting rights were a consequence of national reforms that were exogenous to each town. Nevertheless, there are town characteristics that we might expect to be correlated with both the extent of the franchise and public goods. Town population is linked to our franchise variable by construction, but might also be related to economies of scale in the provision of sanitation. Population growth and urban crowding may affect demand for public goods, and also the extent of the franchise, because of the head of household and residence requirements. Finally, previous studies suggest that female enfranchisement may be associated with greater demand for public goods, and also capture idiosyncrasies in voter registration.

Consequently, I control for these four variables, as well as town and year fixed effects, in all specifications. To capture possible economies of scale in city size, population is binned into six categories to allow for potential economies of scale, while the other three—population growth, urban crowding, and the female franchise—enter linearly. Town fixed effects control for time-invariant characteristics of towns (e.g., proximity to water supply), and year fixed effects capture common trends in town council expenditure.

I start by estimating $g(\cdot)$ semi-parametrically, using the procedure suggested Baltagi and Li (2002) That is, I first "residualize" each dependent variable by deducting predicted values from the parametric part of (1). I then investigate the shape of the relationship between the male franchise and those residuals using a Nadaraya-Watson non-parametric regression.

Figure II shows clear evidence of a robust inverted-U-shape relationship for both town tax receipts and spending on public goods—both total spending, and when restricting to only sanitation expenditure. To aid interpretation, each dependent variable is scaled as a percent of the sample median. In all three panels, there is evidence that the dependent variable increases until a franchise of approximately 50% of the adult male population, and then declines beyond this point. This level of the franchise represents around the median level of the franchise prior to the reforms of 1869, and around the 25th percentile of the franchise immediately following the reforms. The more limited data available for sanitation

expenditure—available only from 1872 onward—is reflected in the less emphatic upward sloping portion of the curve.

The figure also suggests that the estimated effects of franchise extension were economically significant, and robust to inclusion of additional alternative control variables—a finding reinforced in Table III below. First, I include a measure of the tax base per capita. This variable captures potential wealth effects in the town, and also controls for the fact that an increasing franchise could, in principle, be associated with a higher tax base (see Section 3.1).[22] Town occupational structure provides an alternative source of variation in demand for public goods—water supply was, for example, demanded partly for industrial purposes (Hassan, 1985)—and so I control for the percentage of the population engaged in agriculture and commerce, and the percentage of the population heads of household.[23] I include population–decade fixed effects to capture the fact that there may have been differential take-up of new public goods (e.g., trams, or electricity supply) according to town size. Finally, I include lagged dependent variables to capture differences in prior investment in public goods. None of these lead to major changes in the shape of the observed relationship between the size of government and the franchise.

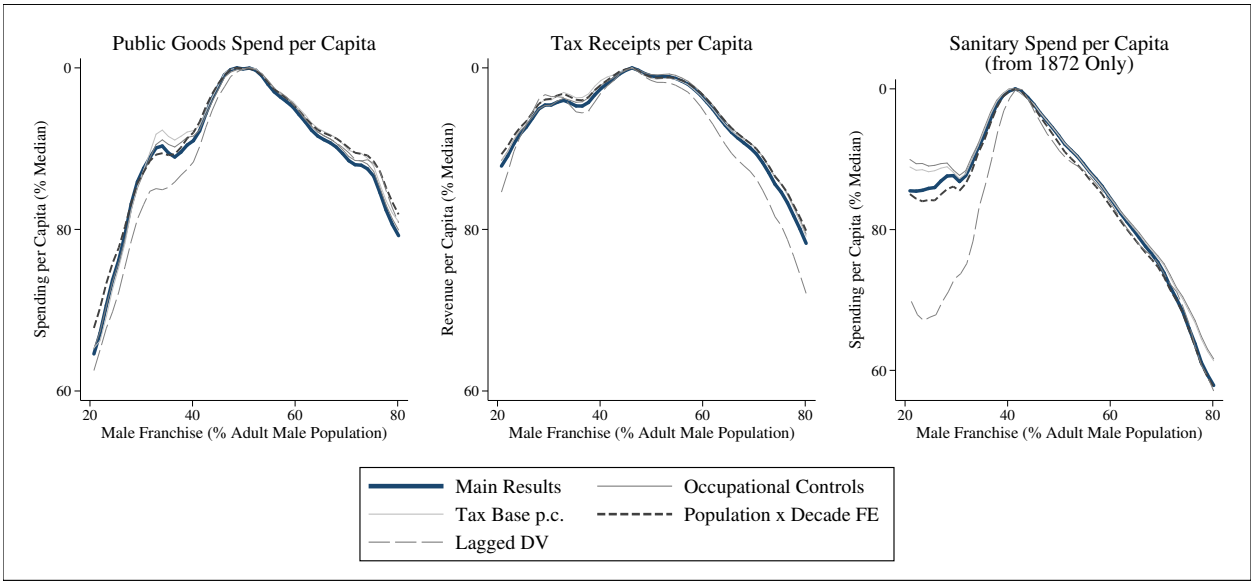
The existence of an inverted-U-relationship is also demonstrated when modeling $g(\cdot)$ with a standard quadratic specification, as shown in the first six columns of Table III. These specifications support the visual relationships for the three dependent variables in Figure II. In nearly every case, the quadratic terms are both individually and jointly statistically significant—with the sole exception (the coefficient on the linear term specification (6)) likely reflecting the fact that sanitation data is not available before 1872. Further, they meet Lind and Mehlum (2010)'s test, which tests the joint restriction that the relationship should

[22]This variable also addresses an alternative potential connection between the franchise and the tax base: that poorer towns were forced to tax the poor and hence give them the right to vote. However the analysis in Table II has already demonstrated that this does not occur to have been the case.

[23]This latter variable is included to account for possible differences in the presence of servants (and so town wealth), since not being a head of household could directly lead to male disenfranchisement.

be positive at lower franchise levels, and negative at higher levels. Additional regressions reported in Appendix E confirm that similar results hold when including the additional control variables. There is consistent evidence that extending voting rights led to significant declines in the town spending after around half of the male population was enfranchised.[24]

Figure II: Semi-parametric regression shows inverted-U-relationship between franchise and both per tax receipts and expenditure.



Note: The figure displays the estimated nonlinear part of the partially linear model for specification (1). All specifications include include year and town fixed effects, female franchise, population (in 6 bins), urban crowding and population growth in all specifications. The relationship is estimated using annual financial data from 1867–1900, with franchise data lagged three years. "Occupational controls" include the % of the population engaged in agriculture, the % in commerce, the % of men over 20 that are heads of household. "Population x Decade FE" allows for differential time trends for each population category.
The procedure is as follows. First, the parametric element of the specification is estimated using the Baltagi and Li (2002) fixed effects estimator for partially linear data models. The residuals are then plotted above using a Nadaraya-Watson nonparametric regression with an Epanechnikov kernel, and bandwidth of 3.

[24]See Appendix Tables A.XVII and A.XVIII for details. In addition to the inclusion of the control variables in Figure II, I also include a specification replacing the dummy variables for population with a quartic in town population.

I use the quadratic specification due to ease of interpretation, however the inverted-U-relationship is strongly supported when allowing for a more flexible relationship. In Appendix E.1 I model the relationship with fractional polynomials, allowing for a much wider range of non-linear shapes—not imposing, for instance, symmetry.[25] The estimated turning points are similar and, for total publics goods spending, the quadratic provides the best fit to the data.

The final two columns of Table III present the results of a placebo test, showing that the inverted-U-relationship is not driven, in some way, by the structure of the data. The dependent variable here is the per capita town receipts from property sales and rents—a variable over which the town councils had limited control because it was determined by the extent of their estates, which varied considerably across towns.[26] As we can see, there is no evidence of a relationship—and the signs of the coefficients are inconsistent with an inverted-U-shaped relationship.

[25]Specifically, the approach compares the fit of models based on choosing from a set of fractional powers, as well as allowing for logarithmic relationships. Following Royston and Altman (1994), I allow the degrees to be chosen from the set {-2,-1,-0.5,0,0.5, 1, 2 ,3}, where a degree of 0 refers to $log(x)$, and non-zero degrees refer to exponents.

[26]See Millward and Sheard (1995) for discussion of the variation in estate holdings across towns. The relationship is also weak and statistically insignificant when allowing for a linear relationship with the franchise, with coefficients of 0.10 (S.E.=0.17), and 0.16 (S.E.=0.14) for the two specifications.

Table III: Quadratic specifications show inverted-U-shape relationship.

	Dependent Variable (per Capita, % of Median):							
	Public Goods Spend		Tax Receipts		Sanitation Spend (from 1872 only)		Property Receipts (Placebo, from 1872 only)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Inverted-U-Shape								
Turning Point (%)	52	53	44	43	48	45	50	39
F-test (p-val)	0.00	0.00	0.00	0.00	0.00	0.01	0.90	0.91
U-test (p-val)	0.00	0.00	0.00	0.01	0.04	0.12	0.34	0.42
Δ in Dependent Variable:								
Increase ($fran \leq T$)	44	42	15	11	34	20	-	-
Decrease ($fran \geq T$)	37	28	37	31	50	43	-	-
Panel B: Regression Details								
Male Franchise	0.47***	0.42***	0.24***	0.19***	0.46**	0.31	-0.33	-0.16
	(0.124)	(0.121)	(0.073)	(0.066)	(0.218)	(0.218)	(0.745)	(0.651)
Male Franchise Sq	-0.05***	-0.04***	-0.03***	-0.02***	-0.05**	-0.03*	0.03	0.02
	(0.012)	(0.011)	(0.007)	(0.007)	(0.019)	(0.018)	(0.075)	(0.067)
No. Observations	4856	4811	4856	4811	4181	4143	4221	4183
No. Towns	150	149	150	149	150	149	150	149
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y	Y	Y
Occupation Controls	N	Y	N	Y	N	Y	N	Y
Tax Base per Capita	N	Y	N	Y	N	Y	N	Y

Note: Panel A shows the details of the inverted-U-shape estimated from the quadratic specifications using annual financial data for 1867–1900. "F-test" relates to a test of joint significance of the two franchise variables. U-test relates to Lind and Mehlum (2010)'s test of U-shaped relationships. Panel B shows details of the regressions. Franchise coefficients represent the effect of a 10% increase in the franchise (lagged 3 years). "Demographic controls" include town population (in six bins), urban crowding, decadal population growth, and female franchise. "Occupational controls" include the % of the population engaged in agriculture, the % in commerce, and the % of men over 20 that are heads of household. Standard errors are clustered by town and displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table IV shows that the the inverted-U-relationship is also evident when restricting the sample to focus on the effects of the national reforms discussed in Section 4. In these specifications, I separate the data into six equally spaced time five-year periods (1867-1871, 1872-1876, etc.) around the reforms. By doing so I focus the identification on the changes in the franchise resulting from these reforms, and also avoid the extensive interpolation needed to construct the annual franchise data used in the main specifications.[27] Again, the results demonstrate an inverted-U-relationship with a turning point when around half of adult men are enfranchised.

The inverted-U-relationship is robust to varying the sample of towns used in the regressions—results are reported in Appendix E.2. To check the results reflect within-town variation—rather than differences between towns with a low franchise (to the left of the turning point) and those with a high franchise—I re-estimate the results using only those towns initially below the turning points identified in Table III. I also report specifications with i) a balanced panel of towns, ii) including towns excluded as outliers due to very high or very low values of the franchise, and iii) removing the top or bottom 10% of the sample of population and (separately) removing towns in the top and bottom decile of the 1873 tax base per capita. The conclusions are similar in all cases.

[27]These specifications use franchise data only from years the number of electors was reported to estimate the average level of the franchise in each 5 year period. Some towns had missing data for specific years: in this case I use the interpolated data.

Table IV: Inverted-U-shape evident when aggregating data into 5 year periods.

	Dependent Variable (per Capita, % of Median):			
	Public Goods Spend		Tax Receipts	
	(1)	(2)	(3)	(4)
Panel A: Inverted-U-Shape				
Turning Point (%)	52	54	44	43
F-test (p-val)	0.00	0.00	0.00	0.00
U-test (p-val)	0.00	0.00	0.00	0.01
Δ in Dependent Variable:				
Increase ($fran \leq T$)	52	48	16	11
Decrease ($fran \geq T$)	37	26	36	29
Panel B: Regression Details				
Male Franchise	0.56***	0.47***	0.27***	0.20***
	(0.148)	(0.143)	(0.077)	(0.071)
Male Franchise Sq	-0.05***	-0.04***	-0.03***	-0.02***
	(0.014)	(0.013)	(0.008)	(0.007)
No. Observations	971	956	971	956
No. Towns	150	149	150	149
Year Fixed Effects	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y
Occupation Controls	N	Y	N	Y
Tax Base per Capita	N	Y	N	Y

Note: The table shows the results from splitting the sample into seven 5-year periods, and using only non-interpolated franchise data as follows: 1867–71: 1866; 1872–76: mean of 1869 and 1871; 1877–1881: mean of 1873 and 1879; 1882-1887: mean of 1879 and 1883; 1888–1892: 1885; 1892–1896: mean of 1885 and 1897; 1897–1900: 1897. "F-test" relates to a test of joint significance of the two franchise variables. U-test relates to Lind and Mehlum (2010)'s test of U-shaped relationships. See Table III for details of control variables. Standard errors are clustered by town and displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.2 Poverty and Franchise Extension

I now move away from testing the inverted-U-relationship as a whole, and focus explicitly on the effect of enfranchising the poor between 1866 and 1879. I use information on local income distributions to estimate where national reforms enfranchised the poor, and where

new voters consisted of only "middle class" individuals. This approach accounts for the fact that two towns could have very different electorates even if they had exactly the same percentage of the population enfranchised.

To identify the effect of the reforms on the composition of the electorate, I take advantage of an 1866 Parliamentary Paper reporting the distribution of housing rental values in those towns represented in Parliament.[28] I then seek to define a group of "poor" voters whose income is low enough that they would fall on the downward sloping portion of the inverted-U: according to the model, towns where such voters were enfranchised will have lower expenditure than towns with a more restricted franchise.[29] To do so, I define a household as "poor" if the rental value is less than the average rent paid by an urban working class household (estimated using information from Horrell (1996)). I then estimate the percentage of voters that were poor in each town on the basis of two assumptions: first that all compounders (indirect tax payers) were poor and, second, that the franchise was extended in the order of income.

With this measure in hand, I examine the effect of the reforms by defining a "treatment" group of towns in which the proportion of poor voters increased between 1866 and 1879. Using this binary measure ensures the results are not driven by variation regarding the percentage of new poor voters—which could more plausibly be within the control of elites—but just whether the reforms increased the share of poor voters at all.[30] I then compare changes in spending and revenue in the two groups across three periods: pre-reform (1867–1872), immediately post-reform (1873–1878), and after the reforms have consolidated (1879–1884).[31]

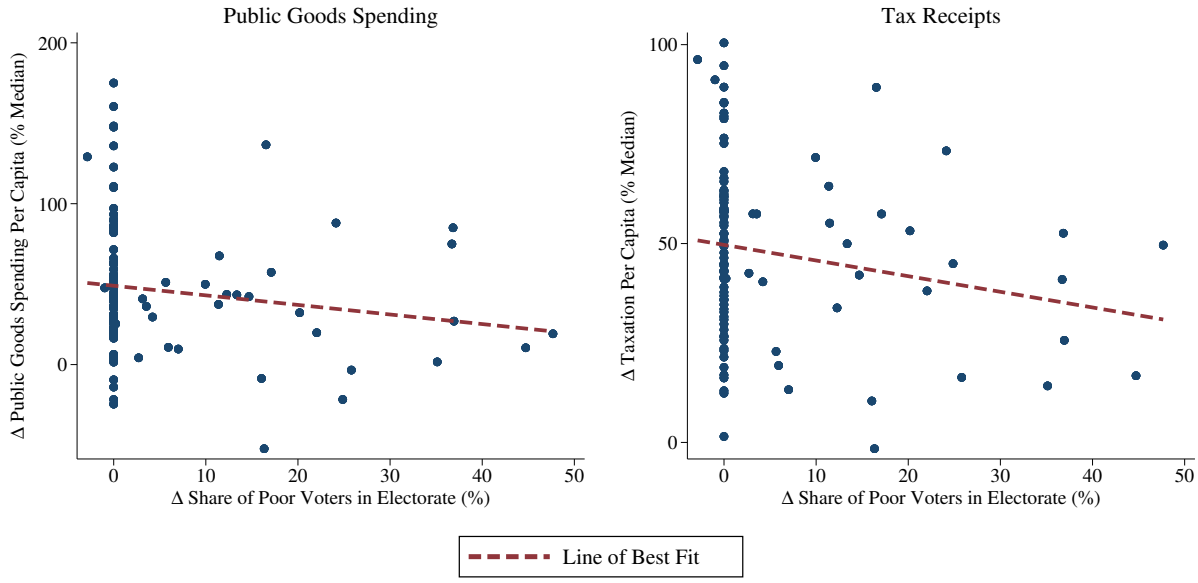
[28]Appendix D.2 provides full details of the construction of this variable, and Appendix D.3 demonstrates that the results here are robust to alternative definitions of "poor" households.

[29]The definition of poor here does not, however, seek to identify all voters on the downward portion of the curve; hence even if these voters are not enfranchised, the franchise may be broad enough to generate opposition to spending.

[30]However, as shown in Appendix D.3 the results are similar when using a continuous measure.

[31]The pre-reform period includes years after 1869 on the basis, as above, that changes in the electorate

Figure III: Lower growth in spending where poor voters were enfranchised.



Note: The figure displays change in spending over two periods: 1867–1873 and 1879–1884. The x-axis displays the change in the share of "poor" voters in the electorate measured in 1866 and 1879 respectively (see Appendix D.2 for details of the construction of this variable). Data on poor voters is only available for towns that were represented in Parliament.

There is clear evidence that towns where the poor were enfranchised experienced lower growth in both tax revenue and expenditure, both graphically (Figure III) and in regression analysis (Table V). The figure displays the negative relationship between the change in each dependent variable between the pre-reform to the post-reform period, plotted against the change in the share of poor voters. The regressions then allow us to control for other changes in town characteristics.

As a final test that the relationship is causal, in specifications (3) and (6) I restrict the sample to those towns in which not all compounders were enfranchised by the Small Tenements Rating Act in 1866. In doing so, I focus on towns in places which had (to varying degrees) opted against such enfranchisement prior to the analysis period. Once again, it is

will take some time to affect town decision-making. As shown in Appendix D.3, the results are similar (but noisier) when using four-year periods, and restricting the analysis to the years 1867–1881.

clear that the enfranchisement of the poor was followed by both lower tax revenue and lower spending on public goods.

Table V: Towns where the 1869–1878 reforms enfranchised the poor had lower growth in tax revenue and spending on public goods.

	Dependent Variable (per Capita, % of Median):					
	Public Goods Spend			Tax Receipts		
Poor Enfranchised	-0.14**	-0.09	-0.18*	-0.10***	-0.08**	-0.12***
x 1873–78	(0.068)	(0.069)	(0.093)	(0.038)	(0.033)	(0.045)
Poor Enfranchised	-0.23***	-0.16**	-0.26**	-0.11**	-0.08*	-0.12**
x 1879–84	(0.085)	(0.079)	(0.112)	(0.045)	(0.044)	(0.054)
Sample	All	All	Limited STRA	All	All	Limited STRA
No. Observations	1789	1756	1157	1789	1756	1157
No. Towns	102	102	66	102	102	66
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y
Occupational Controls	N	Y	N	N	Y	N
Tax Base per Capita	N	Y	N	N	Y	N

Note: Independent variables are dummies reflecting whether the estimated share of poor voters in the electorate increased between 1866 and 1879 (see text and Appendix D.2 for details). The "Limited STRA" sample excludes towns where the Small Tenements Rating Act—which in principle enfranchised renters paying tax through their landlord—was fully in place in 1866. See Table III for details of control variables. Standard errors are clustered by town and displayed in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6 Mechanisms

These results provide clear support for the theoretical prediction of an inverted-U-relationship between the extension of the franchise and spending on public goods. I now focus more sharply on the mechanism underpinning the opposition of the poor to greater public goods provision. The first subsection starts by showing that the assumption of high marginal utility of consumption is reasonable in this context—the poor in nineteenth-century England had insufficient calories and poor nutrition. It then explains the political economy of town spending decisions, in particular the importance of the poor as a political constituency. This analysis justifies the use of the Median Voter Theorem in the model, and demonstrates the importance of taxation in contemporary political debate. The second subsection then addresses alternative explanations for the empirical results, and explains that they do not fit well with the historical context.

I analyze the reasons for opposition (and support) to public spending using the newspaper reports of political debates in both town council elections and plebiscites. We cannot directly measure voter preferences during this period, but we can gain insight into them through the arguments used by the politicians seeking their support. To do so, I collect data from two sets of local newspaper reports of political debates.[32] First, I investigate the debate surrounding local plebiscites regarding public goods expenditure between 1855 and 1905.[33] Second, I undertake a systematic analysis of the topics discussed in the "ward meetings" of candidates seeking election to the Liverpool town council between 1860 and 1880. At these meetings candidates met supporters and canvassed support—I categorize the major topics of

[32]Local newspapers were an important way in which local politicians could reach their electorate: "many readers, including increasing numbers of newly-enfranchised working-class men, wished to follow carefully the actions of local politicians and the columns of the local paper allowed them to do so in relative comfort" (Walker, 2006, p.383). The existence of subscription reading rooms meant that purchase price was not a barrier for the working classes—a rough estimate suggests copies of newspapers were read by around twenty-five people on average (Aspinall, 1946, p.29–30).

[33]See Appendix B.5 for a list of the plebiscites, and details of how they were identified.

discussion in each.[34] These sources demonstrate that the cost of public goods was the main source of opposition to spending, and that the poor were an important political constituency.

6.1 The Opposition of the Poor to Public Spending

The opposition of the poor to public spending has been documented by both contemporaries and historians. The Royal Sanitary Commission in 1869-71 concluded that a plural voting system, under which the wealthy received multiple votes, should be implemented because after the 1869 enfranchisement of the compounders "sanitary reforms [were] in many cases rendered impossible by the hostility of the...poorest class" (House of Commons *Parliamentary Papers*, 1871, p.30). Politicians stood—and won—elections on the basis of their resistance to spending, often as part of a local "economy" party, or with the support of a "shopocracy" of small property owners or local ratepayers' association (see, e.g., Hennock, 1963, 1973; Yasumoto, 2011; Aidt et al., 2010). In one Welsh town "workers were willing enough to admit they were killing themselves, but they saw immediate income as more important than environmental quality" (Hamlin, 1998, p.298).

The resistance to spending becomes less surprising when we consider that industrial workers appear to have been worse nourished than the poor in modern day developing economies. Logan (2009) finds that calorie demand in a sample of 1,000 British households in 1888 was significantly greater than those in rural Indian households in 1983. Specifically, nineteenth-century British households consumed around 40% fewer calories, and had higher income-calorie elasticities—i.e., a greater proportion of income increases were spent on additional calories. Further, a smaller proportion of additional food spending in Britain consisted of higher quality food, indicating a greater degree of hunger.[35] Working class households thus

[34]Liverpool was chosen for this exercise due to both the availability of archival material, the size of the city, and because the need for improved water and sanitation was constantly discussed during this period, culminating in the passing of a plebiscite in favor of the Vyrnwy water scheme in 1879.

[35]In Britain of a 1% increase in food spending around three-quarters went into more food, and 25% into better food (e.g., dairy, meat, vegetables and fruit); in India around half went into better food. These results

faced trade-offs between improved sanitary environments and better nutrition.

Opposition to expenditure on public goods could be expressed both through elections to town councils and directly through local plebiscites. Council elections occurred annually, with councilors serving three-year terms.[36] Those councils then controlled spending decisions, but sometimes turned to plebiscites to confirm taxpayer support for specific projects or increased borrowing, either voluntarily or due to legal requirements.[37]

The high cost of public goods was at the core of opposition to greater spending in both of these settings. There is no evidence in the local newspaper reports that politicians questioned the responsibility of town councils to maintain sanitary environments or public health—we see no equivalent of, for instance, an anti-vaccination movement.[38] Town spending and taxation was a constant theme in the Liverpool elections—a major topic in 92% of ward meetings. Frequently (in 62% of reports) that discussion specifically addressed the sanitation and water supply. But the need for "economy" or a lighter tax burden was consistently emphasized as well—in 49% of meetings, and in all of the campaigns surrounding local plebiscites.[39] In some ways, of course, this is unsurprising: cost is an easy stick with which to beat any proposal. However, it demonstrates that discussions concerning expenditure were consistently centered around a cost-benefit calculus: the results in this paper indicate

are particularly striking given that the industries represented in the British sample mean that the average earnings are much higher than in the population, and are "not generally representative of the laboring poor" (Horrell and Oxley, 1999, p. 499).

[36]Additional details about the election process are provided in Appendix C.3.

[37]Specific pieces of legislation required plebiscites to be held. These plebiscites were by no means symbolic, and were often defeated. Across a sample of 112 plebiscites, based on a search of all ratepayers' polls relating to public goods spending in the British Newspaper Archive, only around 55% were successful. (See Appendix B.5 for further details). The coverage of that database is undoubtedly skewed towards larger areas, and so it is unlikely that the sample is representative of all polls. Nevertheless, the results demonstrate the significant opposition to growing expenditure.

[38]One reason for this could be, as noted by Williamson (2002), that sanitary reformers were proposing correct solutions to sanitation issues even before the germ theory of disease was properly understood.

[39]Other topics were mentioned much less frequently. The most common examples included discussions around temperance and liquor licenses (around 20% of meetings), and the position of Catholics (around 13%). Reports of ward meetings were generally short, and so the absence of a topic does not necessarily mean it was not mentioned.

that for the poorest citizens, the benefits of higher sanitation were simply not worth the taxes they had to pay.

The newspaper reports also show the importance of the working class as a political constituency, justifying the median voter assumption in the model. Both in the Liverpool council elections and in many of the plebiscites, candidates' arguments stress the interests of the "working man".[40] Further, evidence for Parliamentary elections suggests that turnout was similar across different classes of voters: Berlinski et al. (2011) find only weak evidence that franchise extension reduced turnout between 1865 and 1868, and no evidence of any effect by 1874. While we would ideally observe municipal elections directly, this suggests that the poor were represented in elections as much as other classes of voter.

The history of Birmingham demonstrates how both council meetings and plebiscites could be used to block growing expenditure. An 1851 Act of Parliament allowed the town council to embark on a program of sanitary improvements.[41] As costs increased, however, a group of "Economists" emerged on the council, blocking the purchase of the town waterworks, and opposing the expansion of the council's borrowing powers. In the latter case, the Economists were outvoted in the council, at which point they instigated a plebiscite—in which the population overwhelmingly refused to sanction greater expenditure. The Economists then took charge of the council; blocking street improvements and halting drainage works.

Further attempts to expand expenditure continued to meet widespread opposition, particularly among the working classes. Plebiscites in 1860 and 1874 were held under a system whereby occupiers of more valuable property could receive up to six votes; the results thus

[40] In an 1860 plebiscite on expanding Birmingham's voting powers, for example, both sides of the debate sought to appeal to poorer citizens: proponents of the bill claimed it "was of great importance to the poor, who paid rates and received nothing", while opponents hoped that "working men...would see to their own interests and throw out the measure". See *Aris's Birmingham Gazette*, Sat 08/12/1860, p.10 and p.5 respectively.

[41] The discussion in this paragraph is based on Hennock (1973, p.31–33).

provide some evidence as to the support for the bill amongst different classes of voters. In 1860, supporters of the bill (expanding town borrowing powers) held 2.4 votes per voter, compared to 1.5 amongst opponents of the bill. A similar pattern held in 1874 poll, when 80% of the "ordinary" voters with just one vote opposed a motion to increase town council revenue raising powers.[42] The middle classes were willing to pay for greater government spending, but the poor were not.

6.2 Alternative Explanations

The support of the middle class for higher public goods spending is contrary to the predictions of models that explain limited government through the voter with median income (the "median voter") aligning with the rich. In Benabou and Ok (2001), for example, such a coalition forms because the median voter believes her income will be above the mean in the next period. The results in Section 5 show, in contrast, that it is the poor that form a coalition with the rich to resist higher taxation.

Models allowing for multiple policy dimensions could explain the results, however they are inconsistent with the empirical context. The model's assumption of a single policy dimension fits well with the legal restrictions on council activities. In particular, town councils' spending powers were limited to spending on public goods and they could not, for instance, engage in redistribution. Low public goods spending could thus not be compensated by reallocation of resources.[43] Further, taxation was the prominent issue at local elections and, as we have seen above, local plebiscites allowed the electorate to be heard even on specific expenditure projects. Spending decisions were not confounded by other policy issues.

Further, there is little evidence that attitudes toward public goods expenditure were

[42] In 1874 the average voter for the proposal held 3.3 votes, and against 2 votes; these ordinary voters formed 62% of those turning out. See Appendix Table A.VI for additional details.

[43] This rules out for instance, the situation analyzed in Levy (2005), whereby lower overall government spending is compensated by a shift of resources from redistribution towards education.

capturing affiliations to national political parties. Political parties did operate at municipal level during the nineteenth-century, but local—rather than national—issues dominated when it came to matters of town improvement. There was not a clear mapping between national and local party politics on the issue of public goods provision—the two major political parties (the Tories and the Liberals) were on different sides of the debate in different cities, and in general "divisions could be both across and along party lines" (Fraser, 1976, p175). Opposition to growing expenditure was centered around the detail of local issues, and not party attachment.

More generally, the analysis of the political debates make it clear that class was the key cleavage in town politics. There are frequent mentions of class differences in the newspaper reports, and particular reference to the working classes or the poor (in 15% of reports). Other demographic differences are, in contrast extremely rare—the main exception being a small number of wards where the "Irish-catholic" vote was emphasized in the mid-1870s. Consistent with the theoretical prediction, the key characteristic of the new voters was their low income.

An alternative set of explanations for the inverted-U-relationship allows for the benefit of public goods to vary across groups. The model in this paper assumes a non-excludable public good with equal benefits to all citizens—meaning that variation in demand for public spending is purely due to the differences in tax payments. In those other models, in contrast, the rich prefer private to public provision (Epple and Romano, 1996a,b), or public policies are beneficial only for specific industries (Llavador and Oxoby, 2005).

Such explanations do not, however, fit well with the fact that sanitation investment led to significant health improvements for all economic classes. Urban infrastructure led to major reductions in mortality not only from waterborne diseases, but from airborne diseases as well (Chapman, 2019). Moreover, even wealthy citizens were continually exposed to the unsavory conditions around them, as "even with the growing separation of the classes, many

elements of sanitary condition—water supply, drains, muck in the streets, odors, facilities for relieving oneself, complexion and stature of the people—were truly public" (Hamlin, 1998, p.281). The life expectancy of different social classes moved closely over time (Lizzeri and Persico, 2004), and differences in life expectancy between inner and outer portions of cities remained relatively constant between 1851 and 1900 (Szreter and Mooney, 1998, Table 2). The wealthy could not obtain these public health benefits privately, nor did they gain more from public goods expenditure than poorer voters.

For similar reasons, the public goods here do not correspond closely to the theoretical framework of Llavador and Oxoby (2005), in which government policy benefits only manufacturing interests—leading to opposition from both landlords and agricultural groups. While some sanitation public goods, such as water supply, had industrial as well as health benefits, few of the towns we had analyze had important agricultural interests: the median town only had 12% of the population engaged in agriculture.[44] Further, politicians did not criticize spending on the basis that it would only benefit specific occupational groups.[45] The poor benefited from public goods, but they preferred not to pay for them.

7 Discussion

This paper has shown that the extension of voting rights to the poor can increase opposition to government expenditure on critical public goods, including sanitation. In nineteenth-century England, the relationship between the extent of the franchise and voting rights was inverted-U-shaped: spending was highest when the franchise was extended to around 50% of adult male citizens. I have presented a model, supported by empirical evidence, that argues

[44]Moreover, that percentage includes some surrounding areas of towns, meaning that this figure is likely an over-estimate.

[45]There are occasional suggestions in the (very large) cities of Birmingham and Liverpool, that specific items of expenditure were focused in wealthier neighborhoods. However, as shown in Appendix E, the main results are similar when excluding the largest towns, indicating that this effect is not driving the findings.

that the poor were unwilling to pay taxes because of a high marginal utility of consumption. Crucially, they had to bear some of the cost of providing those public goods—a cost that they had to trade-off with additional calories, and better nutrition.

These results have important implications for studies of the relationship between inequality, redistribution, and democracy. Most theories suggest franchise extension will lead to an increase in the size of government (e.g., Boix, 2003; Meltzer and Richard, 1981; Lizzeri and Persico, 2004; Acemoglu and Robinson, 2000, 2001, 2006).[46] This model, however, suggests that may not be the case if the franchise is extended far enough: elites may thus, in some contexts, prefer broad rather than narrow franchise extensions. More generally, the results imply that spending and taxation will be highest when political power rests with the middle class, contrary to the classic prediction that higher inequality will lead to higher redistribution.

The paper's findings apply to a range of historical and contemporary contexts. The model relies on two key assumptions regarding government activity, both of which are frequently met in practice. First, government spending must be focused on public goods rather than transfers—true of legally constrained subnational local governments today, and national governments prior to the nineteenth century. Second, the poor must bear at least some of the burden of taxation—as they do through the continued use of consumption taxes, excise duties, and user fees in nearly all countries.[47] In the specific context of public goods provision, taxes to combat climate change are often criticized due to their impact on the poorest (Chiroleu-Assouline and Fodha, 2014; Mathur and Morris, 2014).

A particularly relevant modern parallel is the widespread emphasis on cost recovery in the provision of sanitation and water supply in developing countries. There is evidence

[46] See also Conley and Temimi (2001); Justman and Gradstein (1999); Jack and Lagunoff (2006); Bertocchi (2011); Borck (2007).

[47] A recent study of 20 OECD countries found that citizens in the bottom income decile face a VAT tax burden of almost 14% and an excise tax burden of almost 5% of income (OECD/KIPF, 2014). Author's calculations using simple cross-country averages based on data in Table 2.1 and 2.5.

that low willingness-to-pay can hamper the provision of such public goods (Cameron et al., 2019), and that high subsidies may be required to increase take-up (Dupas, 2014; Guiteras et al., 2015). In some cases, political opposition to increased tariffs has precluded sustainable investment (Boland and Whittington, 1998; Herrera and Post, 2014; Marson and Savin, 2015; Herrera, 2014). If public goods provision is to be decentralized, as is often advocated, then such political constraints need to be accounted for.

How might one overcome opposition to expenditure on these essential public goods and services? The clearest answer is to reduce the burden of taxation that falls on the poor. The examination of the English case suggests that a major barrier was the restricted tax schedule that town councils were allowed to impose. If they had been able to implement a more progressive taxation schedule then the poor would not have faced the same incentives to oppose expenditure, and political outcomes may have been very different.

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Online appendix - not intended for publication

A Proofs

Proof of Proposition 1

Proof. Individuals consume whatever remains after taxation $c_i = y_i(1-\tau)$. Denote average income as $\bar{y} = \frac{Y}{N}$. Then the individual's problem is

$$\max_{\tau_i} U = u(y_i(1-\tau_i)) + v(\tau_i \bar{y})$$

First note that this problem has a unique maximum since $U(c_i, G)$ is strictly concave. The assumptions that $\lim_{x\to 0} u'(x) = \lim_{x\to 0} v'(x) = \infty$ ensures an interior solution.

Since $g_i^* = \tau_i^* \frac{Y}{N}$ I proceed by identifying the optimal tax rate as a function of individual income. Taking the first-order conditions, the optimal τ^* is implicitly defined by the equation:

$$y_i u'(c_i^*) = \bar{y} v'(\tau_i^* \bar{y}) \tag{2}$$

where $c_i^* = y_i(1-\tau_i^*)$.

As y_i increases, it must be the case that c_i^* increases. To see this, consider otherwise. Since consumption is lower, the value of the left hand side would increase relative to the right hand side. Further for consumption to fall, the tax rate must be higher. But then the right hand side of the equation will decrease, meaning there is no equilibrium.

Using implicit differentiation to identify $\frac{d\tau^*}{dy}$ yields:

$$\frac{d\tau^*}{dy_i} = -\frac{u'(c_i^*) + \frac{dc_i^*}{dy_i} y_i u''(c_i^*)}{-y_i^2 u''(c_i^*) - \bar{y}^2 v''(\tau_i^* \bar{y})}$$

The denominator of this expression is strictly positive, since both $u(\cdot)$ and $v(\cdot)$ are strictly concave by assumption. Then $\frac{d\tau^*}{dy_i} \geq 0$ when the numerator is positive:

$$\begin{aligned} -u'(c_i^*) - y_i(1-\tau_i^*)u''(c_i^*) &\geq 0 \\ -c_i u''(c_i^*) &\geq u'(c_i^*) \\ r_R(c_i^*, u) &\geq 1 \end{aligned}$$

where $r_R(c_i^*, u)$ denotes the coefficient of relative risk aversion. Implicitly define $\tilde{y}$ by $r_R(\tilde{y}(1-\tilde{\tau}_i^*)) = R_R(\tilde{c^*}) = 1$. Then by assumption 2, for any $y_i < \tilde{y}$ $R_R(c_i^*) > 1$. Further, since r_R is monotonically decreasing, it is sufficient to show that there is j with $c_j^* \geq \tilde{c^*}$. Consider an individual j with $y_j > \tilde{c}^* + \hat{G}$. Since $v'(\hat{G}) = 0$, j will consume strictly more than $\tilde{c}^*$ This completes the proof. □

Proof of Proposition 2

Proof. First, note that preferences over τ are single peaked, since $U(\cdot)$ is strictly concave. Then for a given electorate we can apply the standard Median Voter Theorem. (Note that the median voter here is not necessarily equivalent to the voter with the median income). From Proposition 1, we know that τ_i^* reaches a unique maximum at $y_i = \tilde{y}$, and the optimal tax rate is decreasing in y_i for $y_i > \tilde{y}$.

Define τ^0 as the median tax rate under E_0, and τ_i^m as the median optimal tax rate when i is the poorest enfranchised citizen. Order the voters in order of income. That is voter $i+1$ is the next richest voter after voter i. For all citizens $\{i|y_i \geq \tilde{y},\ i \neq E_0\}$, $\tau_i^* > \tau_{i+1}^* \geq \tau^0$. Thus as each of these citizens are enfranchised τ^m (weakly) increases. Further, this increase is strict at some point since $|\{i|y_i < \tilde{y}, i \neq E_0\}| \geq 2$. By proposition 1, the optimal tax rate is increasing in y_i for $y_i < \tilde{y}$. Then all citizens $\{i|y_i < \tilde{y}\}$, $\tau_i^* > \tau_{i-1}^*$. As a result, if the median tax rate decreases as the franchise is increased, it will always decrease for further

extensions.

Now suppose τ^m never decreases as the electorate increased. Then $\tau_i^m \geq \tilde{\tau}\ \forall i$ with $y_i < \tilde{y}$. But this is not the case, since by assumption there are at least two citizens for which $\tau_i^* < \tilde{\tau}$.

To complete the proof, note that the level of the tax rate directly maps to the level of public goods expenditure per capita, since $g = \tau \frac{Y}{N}$

□

A.1 Extension to Progressive Tax System

In the main text I present the model with a proportional tax rate both for simplicity and because it closely matches the historical setting of the empirical analysis. However, the result of proposition 1 holds for a more general, progressive, tax structure where the consumption of individual i is:

$$c_i = y_i - t(y_i)$$

and $t(y_i)$ is a tax burden varying according to income, characterized by

$$t(y_i) = s(y_i)T$$

where T is the total tax revenue (and hence public goods spending) and $s(\cdot)$ is a function identifying the share of the total taxation paid by an individual. Note that if $s(y_i) = \frac{y_i}{Y}$ then this simplifies to a proportional tax system.

I consider tax systems that are (weakly) progressive as defined by constraints on the tax elasticity $\epsilon(y)$:

$$\epsilon(y) = \frac{t'(y)}{t(y)} y$$

A tax system is, as usual, defined as progressive if $\epsilon(y) > 1$, and regressive if $\epsilon(y) < 1$.

For a proportional tax system $\epsilon(y) = 1$. I assume that there is some y such that the tax system is progressive at y and that, in addition, the tax system is increasingly progressive at higher incomes: $\epsilon' \geq 0$ with weakly increasing marginal tax rates: $s''(y) \geq 0$.[48] To ensure marginal tax rates of between 0 and 1 I assume that $s'(y) \in [0, \frac{1}{\tilde{G}+1}]$ $\forall y$. Finally, I assume that $s(y) > 0$ $\forall y > 0$—that is, all citizens bear some of the tax burden.

With these assumptions I re-state the proof of proposition 1 as follows.

Proof. The proof proceeds by first characterizing the conditions under which the optimal level of taxation is increasing in income and showing that this function has a single turning point.

Individuals face the following optimization problem:

$$\max_T U = u(c_i) + v\left(\frac{T}{N}\right)$$

This problem has a unique maximum since $U(\cdot)$ is strictly concave. Taking the first-order conditions, the optimal T^* is implicitly defined by the equation:

$$\begin{aligned} F(T^*; y, Y) &= -\frac{dc}{dT}u'(c^*) + \frac{1}{N}v'\left(\frac{T^*}{N}\right) = 0 \\ &= -s'(y)u'(c^*(y)) + \frac{1}{N}v'\left(\frac{T^*}{N}\right) = 0 \end{aligned} \tag{3}$$

where for simplicity I drop the i subscripts on y_i and c_i and denote i's consumption at their optimal level of taxation as $c^* = (y - s(y)T^*)$. The assumptions that $\lim_{x\to 0} u'(x) = \lim_{x\to 0} v'(x) = \infty$ ensure an interior solution.

In the remainder of the proof I only display the arguments of the c^*, s, s', T^* if needed for clarification.

[48] Note that increasing marginal tax rates are implied by an increasing tax elasticity if the tax is progressive but not if the tax is regressive.

Lemma 1 The optimal level of consumption is increasing in y:

$$\frac{dc^*}{dy} > 0 \ \forall y$$

Proof. First note that we can write:

$$\frac{dc^*}{dy} = 1 - s'T^* - \frac{dT^*}{dy}s$$

Since, by assumption, $1 - s'T^* > 0$ then $\frac{dc^*}{dy} < 1$ if and only if $\frac{dT^*}{dy}s > 0$. Now consider $y_2 > y_1$ with associated consumption $c_2^* < c_1^*$ and $T_2^* > T_1^*$. But then $u'(c_2^*) > u'(c_1^*)$ and $v'(T_2^*) < v'(T_1^*)$ violating equation 3. □

Using implicit differentiation to identify $\frac{dT^*}{dy}$ yields:

$$\frac{dT^*}{dy} = -\frac{F_y(T^*; y)}{F_{T^*}(T^*; y)}$$
$$= -\frac{[-s'u'(c^*) - s(1 - s'T^*)u''(c^*)]}{s^2u'' + \frac{1}{N}v''(\frac{T^*}{N})}$$

The denominator of this expression is negative since both $u''(\cdot)$ and $v''(\cdot)$ are strictly negative and $s > 0$. Then the sign of this derivative is determined by the sign of the numerator and $\frac{dT^*}{dy} \geq 0$ if and only if:

$$-[-s'u'(c^*) - s(1 - s'T^*)u''(c^*)] \leq 0$$

Denoting the coefficient of absolute risk aversion and the coefficient of relative risk aver-

sion at c^* as R_A^* and R_R^* respectively, then the optimal tax rate is increasing if:

$$
\begin{aligned}
s'u'(c^*) + s(1 - s'T^*)u''(c^*) &\leq 0 \\
s(1 - s'T^*) &\geq \frac{-s'u'(c^*)}{u''(c^*)} \\
s(1 - s'T^*) &\geq \frac{s'}{R_A^*} \\
s(1 - s'T^*) &\geq \frac{c^* s'}{(c^*)R_A^*} \\
s(1 - s'T^*) &\geq \frac{c^* s'}{R_R^*} \\
R_R^* &\geq \frac{c^* s'}{s(1 - s'T^*)} \\
R_R^* &\geq \frac{(y - sT^*)s'}{s(1 - s'T^*)} \\
R_R^* &\geq \frac{ys' - s}{s(1 - s'T^*)} + 1 \\
R_R^* &\geq \frac{\left(\frac{ys'}{s} - 1\right)}{(1 - s'T^*)} + 1 \\
R_R^* &\geq \frac{(\epsilon(y) - 1)}{(1 - s'T^*)} + 1 \qquad (4)
\end{aligned}
$$

Note that in this sequence we rely on lemma 1 to show that $s(1 - s'T^*) > 0$.

Inequality 4 establishes the conditions under which the optimal tax rate will be increasing in individual income. To complete the proof I proceed in two steps. First I show that there is at least one income y_1 where the inequality holds strictly (the optimal tax rate is rising in income) and some point $y_2 > y_1$ where the inequality strictly fails to hold. In the second step, I then show that there is no point $y_3 > y_2$ where the tax rate is again increasing in income.

Now, consider any income $\hat{y}$ such that $\epsilon(\hat{y}) > 1$ (i.e. the tax system is progressive). Then the right hand side of (4) is greater than 1, since $(1 - s'T^*) > 0$ by Lemma 1. By assumption there exists $\hat{c}$ such that $R_R(\hat{c}) < 1$. An individual with income $\hat{\hat{y}} = \hat{c} + \hat{G}$ will consume at

least $\hat{c}$ and so will have relative risk aversion less than one, and so inequality (4) will strictly fail to hold.

I now show there is $\underline{y}$ such that (4) is strictly satisfied. By assumption 2 there exists y such that $R_R(c^*(y)) > 1$ and so it is sufficient to show that for low enough y the right hand side of (4) is less than or equal to 1.

First, consider the case where the tax schedule is at some point regressive. Then the right hand side of 4 is always less than one. Now consider the case where the elasticity $\epsilon(y) \geq 1 \ \forall y$. It is sufficient to show that:

$$\lim_{y \to 0} \frac{ys'}{s} = 1 \tag{5}$$

since $(1 - s'T)$ is bounded above by our assumption on s' and the fact that $T^*(y) < \hat{G} \ \forall y$. As such, if (5) holds then the right hand side of (4) will tend to 1 as $y \to 0$.

We can write 5 as follows

$$\lim_{y \to 0} \frac{f(y)}{g(y)} \left(\frac{f'(y)}{g'(y)} \right)^{-1}$$

where $f(y) = y$ and $g(y) = s(y)$.

If we can apply L'Hopital's rule then $\lim_{y \to 0} \ \frac{f(y)}{g(y)} = \lim_{y \to 0} \ \left(\frac{f'(y)}{g'(y)} \right)$ and we are done. To apply this rule, three conditions need to be met i) $\lim_{y \to 0} \ y = 0$ ii) $\lim_{y \to 0} \ s(y) = 0$ and iii) $s'(y) > 0$ if $y > 0$. The first condition is trivial. To see the second, suppose otherwise that $\exists L$ such that $lim_{y \to 0} \ s(y) = L > 0$. Then $\lim_{y \to 0} \ \epsilon(y) < 1$ and the tax system is regressive at some point. Similarly for the third condition, consider that $s'(y) = 0$. Then $\epsilon(y) = 0$ and the tax system is regressive.

So far I have shown that there is some point at which the optimal tax function is increasing and a point with higher income at which it is decreasing. However, to complete the proof I must show that T^* cannot not again increase after it has begun to fall. Since T^* is continuous, it is sufficient to show there is not a point $y_3 > y_2$ such that $\frac{dT^*(y_3)}{dy} = 0$.

Suppose otherwise that such a point (or points) exists and consider the lowest such point. Define the following function:

$$h(y) = R_R(c^*(y)) - \frac{(\epsilon(y) - 1)}{(1 - s'T^*(y))} - 1 \tag{6}$$

Then $h(y_2) < 0$, $h(y_3) = 0$ and $h'(y_3) \geq 0$. Differentiating:

$$h'(y) = \frac{R_R^{'}(c^*(y))}{dy} - \frac{\epsilon^{'}(y)}{(1 - s'T^*(y))} + \frac{\epsilon(y)(-s'\frac{dT^*}{dy} - s''T^*)}{(1 - s'T^*)^2} \tag{7}$$

By assumption, $R_R^{'}(c^*(y)) < 0$, $\epsilon'(y) > 0$ and $s'' > 0$. But then if $\frac{dT^*}{dy} = 0$ then $h'(y_3) < 0$ and we have a contradiction. This completes the proof. □

B Data

The majority of the data used in the paper are drawn from reports to Parliament downloaded from the House of Commons Parliamentary Papers Database[49]. A full list of the reports used is available upon request. Other sources are discussed below.

B.1 The Sample

The main sample includes only Municipal Boroughs that were both incorporated (i.e. had councils elected under the system described here) and had control of sanitary expenditure in 1867 (the start of the study period). This does not include London, which was governed separately. A total of 214 towns had been incorporated by 1867; however only 154 had control of sanitary expenditure prior to this date. These towns are identified using a House of Commons paper (House of Commons, 1872b). Specifically, town councils are identified as having had control of expenditure if they are specified to either "have become urban sanitary

[49]See http://parlipapers.chadwyck.co.uk/

authorities in place of Local Boards under The Local Government Act 1858" (category 2 in the report) or to have "acted as sanitary authorities under Local Acts before the date of The Public Health Act 1872" (category 3). For each year, observations are then included if either the town reported sanitary information (as either a Local Board or Improvement Commission prior to 1872) or if b) the town is included in category 3 and never reported separate sanitary accounts—indicating that the accounts were consolidated (this is also supported by hand-checking the original data sources).

This leaves 155 towns, after which five towns were excluded due to specific data issues:

- Folkestone: The town council is stated as having control of sanitary expenditure, however the post 1872 reports of sanitary expenditure are not controlled by the Town Council
- Hastings: The population of the sanitary authority jumped considerably at some point in 1860s, leading to potential downward bias in the level of per capita expenditure pre-reform.
- Shaftesbury, Cardigan and Congleton: values of the franchise are very high (over 90%).

The total population in the included towns in the 1881 census was 6,875,689, comprising 92% of the total population in the 214 towns of 7,446,209. The sample includes 35 of 41 towns with an 1881 population above 50,000 and all towns with an 1881 population above 100,000.[50]

[50]These figures include West Ham and Croydon, which are suburbs of London. The six large towns that were not included are Birkenhead, Bury, Huddersfield, St. Helens, West Bromwich (all incorporated after 1867) and Walsall (where the town council did not control sanitary authority at the start of the period).

B.2 Financial Data

Information is collected from the annual financial accounts reported to Parliament and collated in the *Local Taxation Returns* contained in the Parliamentary Papers collection.[51] These accounts contain detail on the sources of revenue and types of expenditure in each town annually. Each town reported separately as both a municipal borough and as a sanitary authority (as a local board, improvement commission or urban sanitary authority): these accounts are aggregated together. This information is used to construct an annual panel dataset between 1867 and 1910.[52] Financial values are then translated into current prices using the Rousseaux Price Index (Mitchell, 1971, pp. 723–4) following Millward and Sheard (1995).

Defining ongoing public goods expenditure

Prior to 1884 the financial data does not distinguish between one-off and ongoing expenditure items: as such the accounts include a number of very high expenditures, reflecting investment activities. To separate ongoing expenditure from investment expenditure for different types of public good, I first identify "investment periods" by analyzing deviations in trend expenditure in each of the following categories "sewerage and sewer systems", "water supply", "highways, watering and scavenging", and "other public works".

The first three of these categories are defined separately in the financial reports (albeit with some changes over time in the name). However, from 1890 onwards some towns (those that were not made County Boroughs) began to receive much higher transfer funding for spending on roads from their County Council. As such, I adjust expenditure on "highways, watering and scavenging" to remove the amount received from this source. To do so, I separate between revenue from County Councils from the "Exchequer Account" and "Other", since it was the latter that was predominantly consisting of payments for main roads. The

[51] A full list of the papers used is available from the author upon request.

[52] Comprehensive data is not available prior to 1867.

"other public works" series is the aggregate of (loan and nonloan) expenditure on "other public works", "markets", "lighting", "lighting and sewers", "electric lighting", "tramways" "municipal buildings", "bridges", "housing", "asylums", "libraries", "burial", "baths", "hospitals", and "other". In non-investment periods, the level of ongoing expenditure is simply the per capita expenditure in that period. In investment periods, the level of ongoing expenditure is the level of expenditure in the next non-investment period. For instance, if 1873 and 1874 were investment periods, but 1875 was not, then the level of expenditure in 1873 and 1874 is set equal to that in 1875.

For the period following 1871, a year is identified as the beginning of an investment period for each good if:

1. Expenditure per capita exceeds the median percentile of expenditure per capita (across all towns and years) in the relevant category; and:
    - the town started expenditure on the relevant good in that period (the spending in the previous period was 0); or
    - there is a 100% year-on-year growth in expenditure on the good, and the expenditure p.c. exceeds the median future per capita spending for the town; or
    - the two previous years of data are missing, and the expenditure p.c. exceeds the median future per capita spending for the town; or
    - the level of expenditure p.c. is higher than the previous year and twice the median future per capita spending for the town.

The years following the start of an investment period are identified as investment periods if either:

1. expenditure p.c. is greater than the previous period; or

2. the expenditure p.c. exceeds the median future per capita spending for the town; and either:

    - the expenditure is twice the town's average expenditure over the period; or
    - the level of expenditure exceeds the median percentile of expenditure per capita (across all towns and years) in the relevant category.

Between 1867 and 1871, public goods expenditure is not disaggregated in the financial reports, and so I cannot use the process above. Instead, investment periods are identified as being twice the level of ongoing expenditure in 1872, and the above process is then applied to total public goods expenditure in those towns.[53]

Figure A.IV displays the unadjusted and adjusted spending on each of the three components of the sanitation public goods measure, and also the total public goods expenditure. In each case, the plots indicate how, in the absence of adjustment, there are a number of extreme values which could skew the analysis. The percentage of observations identified as investment periods was as follows: Water supply, 13% sewers, 18%; streets 10%; and for total public goods, 36%—where the latter identifies that any of the subcomponents had an investment period.

Figure A.V shows that there was an increasing trend over the analysis period in both town council expenditure and revenue. That growth did not, however, remove the considerable variation in the size of government across towns.

[53]For a small number of towns the first period that disaggregated data was available is later than 1872: in this case investment periods are defined relative to the first period data is available.

Definition of financial variables

Tax receipts: Aggregation of all different "rates" collected by towns as municipality and sanitary authority.

Sanitary public goods expenditure: Sum of ongoing expenditure per capita on "sewerage and sewer systems", "water supply", "highways, watering and scavenging". See previous subsection for details of construction of series.

All public goods expenditure: After 1872, sum of "sanitary public goods expenditure" and ongoing expenditure on "other public works" series (see previous subsection for details). Prior to 1872, total of expenditure on "public works" and on sewerage and lighting.

Tax base per capita: Information on the value of the tax base (the "rateable value" of the district) is reported annually in the *Local Taxation Returns* from 1872 onward, with the exception of 1883. For many years, the tax base is reported separately for the town as a sanitary district, and as a municipal borough—I use the *maximum* tax base reported by the town in each year. Before 1872 information regarding the annual value of the tax base was not reported alongside the financial accounts. However, two additional parliamentary papers do provide information regarding the size of the tax base in sanitary districts (but not municipal boroughs) in 1866 and 1870. In addition, for towns with similar municipal and parliamentary boundaries, I can use information on the rateable value in the parliamentary boroughs in 1866. I then linearly interpolate per capita values for missing years.

B.3 Electoral Data

Information as to the number of electors was collected from returns to Parliament supplemented by information for 1879 reported in Vine (1879). Information for the total number of electors in each town was collected for years 1850, 1852, 1854, 1852–1866, 1869, 1871, 1873, 1879, 1883, 1885 and 1897. Information broken down by gender was collected for 1871, 1885, and 1897. Values relating to the number of electors in Shaftesbury (for all years), Carlisle

(1854) and Buckingham (1866, 1869, and 1873) were excluded, since there were clear discrepancies in the returns (for instance, where the number of parliamentary electors was reported rather than the number of municipal electors).

The time series for total number of electors was estimated as follows. First, the franchise is calculated as a percentage of the total population, using the series relating to the number of electors above. The missing years are then interpolated using a constant compound growth rate—with the exception of the years 1867 and 1868 which are replaced with the 1866 value, since reforms in 1869 led to a large jump in the level of the franchise. Missing values for 1864 and 1865 are replaced with the value from 1866. A compound growth rate is used in order to match the assumption made on the growth of population between decennial censuses. Linear interpolation between periods could bias the results toward finding a downward relationship between a high level of the franchise and spending since it leads to higher estimated values of the franchise in later periods while, at the same time, the estimated population is also higher.

To estimate the male / female franchise used in the main specifications, I first estimate the proportion of male electors in 1871, 1885, and 1897. This series is then interpolated at a constant growth rate for the intervening years. (In general this proportion did not tend to change substantially between periods). Multiplying these two series provides an estimate of the number of male and female electors in each year. The franchise measure is then estimated using the estimated adult male population discussed in the following two subsections.

The key franchise variable used in the paper is calculated using an adjustment factor relating to proportion of males and females that were of voting age (21 and 30 respectively). The main measure uses individual-level census data obtained from the North Atlantic Population Project (Minnesota Population Center, 2008; Schürer and Woollard, 2003). The individual-level data is aggregated to identify the age distribution of voters at the level of

administrative sub-districts.[54] Each town was then matched to the relevant sub-districts using the 1881 census: often each municipal borough was spread across several of these sub-districts (the boundaries did not, unfortunately, overlap directly). To estimate the town-level age distribution I then average across the different sub-districts, weighted by the proportion of 1881 population in each of the sub-districts (which is also identified in the 1881 census).

While this measure should accurately account for variation in the age distribution across towns, one potential concern is the use of a constant adjustment factor for every year. To check whether this is an issue, I compare the estimated proportion to data from the period 1861–1870 collected from the decennial reports of the Registrar General. Unfortunately, this data is only available at the level of the registration district rather than sub-district, and so can be matched to towns less precisely.[55] The resulting comparison shows a very high degree of correlation over time in the town age distribution, providing confidence that our use of a constant adjustment factor is appropriate. Further, the results are robust to these different measures of the franchise.

[54] More precisely, these are the registration sub-districts used by the Registrar General.

[55] Smaller boroughs were often only a small part of a registration district. As such this measure combines urban and rural areas.

B.4 Census Data

Information regarding the population and number of inhabited houses for each town were gathered from census reports between 1861 and 1901, and from the parish-level statistics for the 1911 census gathered by Southall et al. (2004). An "inhabited house" in this context was defined as a distinct building which was inhabited, including "all space within the external and party walls of a building" (Newman, 1971, p.11). Between censuses the population is interpolated at a constant annual growth rate.

In several cases towns underwent boundary changes between census years. To adjust for this, I have identified the towns that underwent boundary changes using the census and the year of the boundary changes using both the census reports themselves and the annual reports of the Local Government Board. The population series is adjusted to the revised population (provided in the census reports) at this date and binned into six categories: less than 10,000 citizens, 10,000-25,000, 25,000-50000, 50,000-100,000, 100,000-250,000 and more than 250,000 citizens.

Occupational structure, and the percentage heads of household, are measured at the level of the Registration Districts used for registration purposes. Occupational data was obtained from the Integrated Census Microdata service through the UK Data Archive, while the percentage heads of household was constructed using the 100% census samples available at Center. (2019).[56] The registration districts changed over time, and so I create a set of synthetic districts with standardized boundaries that accounted for mergers and splits. Each town is then linked to one or more of these districts as explained in the discussion of the franchise data above.

[56]Occupational data could not be obtained for one town due to ambiguity in the place names used in the ICEM data.

B.5 Local Politics

Data on local politics was collected from national and local newspaper collections relying, in particular, on the digital collection of the British Newspaper Archive[57]

Party Mayor Affiliation

The political affiliation of mayors was identified from newspaper reports. From 1871 onwards, incomplete lists were published in national newspapers. (Prior to this date, newspapers that reported lists of mayors reported little (at most) information regarding party affiliation.) This information was then supplemented, including for earlier years, with information from local newspaper reports.

Liverpool Ward-Level Politics

A search was undertaken for details of local election debate in each of Liverpool's sixteen wards annually between 1860 and 1880 using the local newspaper collection of the British Newspaper Archive. Specifically, this involved finding newspaper reports of local "ward meetings", where candidates would address the public. Reports were found for a total of 230 candidates (reports were less common in the many cases where no contest was held).

Local Plebiscites

A search was undertaken of the British Newspaper Archive[58] for local plebiscites between 1848 and 1905. Over three hundred polls of various nature were identified (including some in Scotland and Ireland). Of those polls, 112 appeared to relate to town expenditure on public goods—such as the adoption of new powers, undertaking specific projects, or purchasing private providers or water or gas.[59] The scale of the projects ranged from improvements to a single street, to enabling a £1 million loan to the Manchester Ship Canal Company. On

[57] See http://britishnewspaperarchive.co.uk/. The BNA provides scans of millions of pages of local newspapers from the British Library's collection.

[58] The primary search term used was "ratepayers' polls", with addition of other terms, such as "elections" to identify most relevant results.

[59] Other common topics related to the adoption of church rates, the adoption of the free libraries act, adoption of school boards, or boundary changes.

average, around 5 articles were identified for each poll.

Twenty-six of these plebiscites were chosen for more detailed investigation.[60] Polls were selected based on town and project size (in the expectation that more information would be available), and with a primary focus on sanitation. However, to ensure coverage of a broad range of experiences, some smaller projects and alternative topics were also selected. For each of these polls, additional searches were undertaken to find reports of town meetings or other debates. Those articles were then used to provide more detail on the subject of each poll, and the key arguments used by both proponents and opponents of the motion.

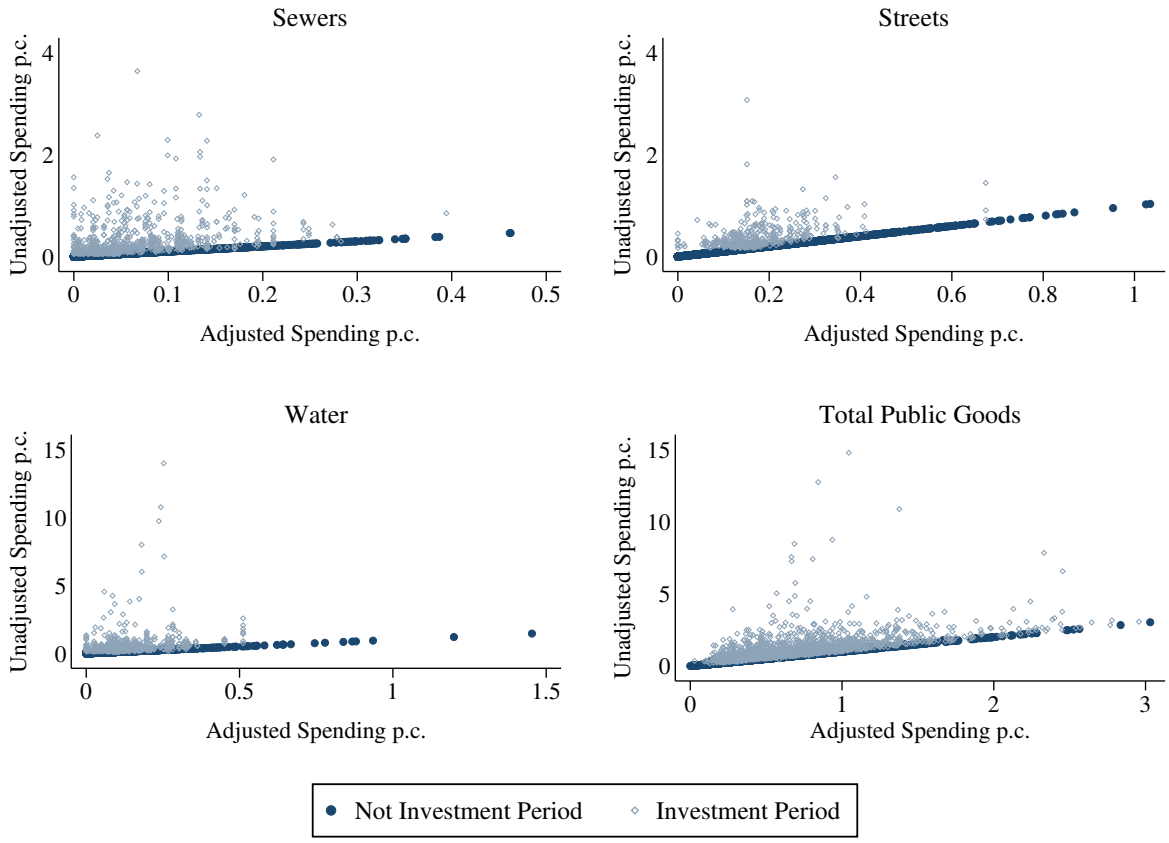
Table A.VI provides a brief description of each of these plebiscites. The topics considered were often complex, particularly if they related to a Parliamentary bill—here the topic highlights the elements most relevant to this paper. We can see that the plebiscites were often keenly contested, and that motions were often lost: only 50% in this list were successful. For a few locations we can glean some insight regarding the preferences of different classes by comparing the number of votes and number of voters for and against each proposal. In these locations a graduated franchise was used, where voters owning or occupying valuable property would have multiple votes.[61] In four out of the six polls, the votes per voters is notably higher for supporters; in the remaining two (Reading and Sunderland), the groups are very similar. These results then provide further evidence that the poor could be part of the opposition to growing expenditure.

The main text refers to twenty-four polls because little or no information was available for the polls in Warrington and Filey.

[60] An additional five polls, implemented simultaneously as part of the debate over the Cardiff Corporation Bill in 1900, were initially selected. However, it became clear that the sprawling nature of the bill meant that the issues of relevance to this paper were little reported, and so these polls were excluded.

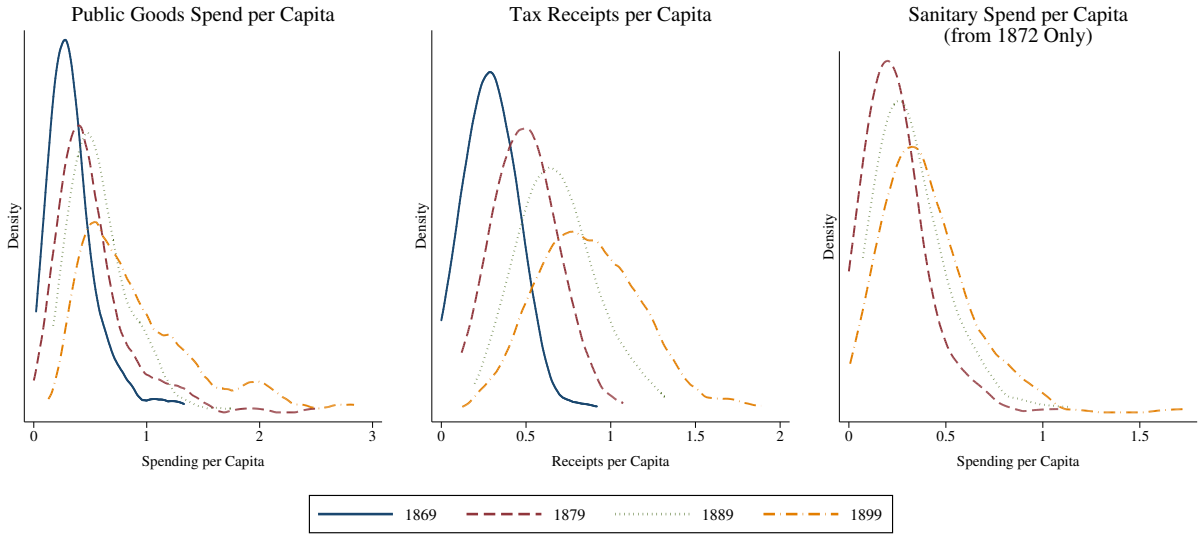
[61] In general limited information regarding the way in which polls were undertaken is provided, and so it is possible that other towns used a similar system without results being reported in this way.

Figure A.IV: Unadjusted and adjusted financial data.



Note: The data used in the regression analysis is plotted on the x-axis in each panel and the unadjusted (apart from conversion to real terms) per capita spending on the y-axis. Investment periods are those where the data was adjusted—see text for details. All values are in £ per capita. Water, sewers, and streets are only available for the period after 1872, and are aggregated into combined sanitation spending in the analysis. Total public goods is available for the entire period, consisting of these three categories as well as "other public goods"—a period is identified as an investment periods for this variable if any of the subcomponents was identified as being in investment period.

Figure A.V: Town council spending and tax revenue grew over time.



Note: See Appendix B.2 for details of series construction.

Table A.VI: Details of Local Plebiscites

Town	Year	Topic	Result
Birmingham	1855	Borrowing for improvement purposes	votes: 171 for, 3,425 against
Birmingham	1860	Borrow money for sewage and other improvements	votes: 6,531 for, 3,802 against; voters: 2,681 for, 2,586 against
Birmingham	1874	Increase tax for sanitary purposes	votes: 2,894 for, 5,410 against; voters: 869 for, 2,664 against
Birmingham	1882	Consolidate previous acts, and added powers re infectious disease	votes: 5,340 for, 5,074 against; voters: 3,216 for, 2,597 against
Bristol	1900	Drainage of sewage	votes: 8,678 for, 19,205 against
Cheltenham	1903	Sewage and sanitation	votes: 2,555 for, 5,904 against; voters: 1,685 for, 4,785 against
Chester	1882	Increase borrowing powers	votes: 3,194 for, 3,307 against
Croydon	1890	General improvements	votes: 10,618 for, 2,722 against
Driffield	1882	Control of water works	votes: 406 for, 834 against
Eastbourne	1885	General improvements, including sanitation	votes: 1,553 for, 2,129 against
Filey	1904	Improvements, including water and gas	votes: 295 for, 215 against
Frome	1874	Water supply	votes: 625 for, 823 against
Leicester	1886	Water supply	votes: 14,357 for, 6,218 against
Liverpool	1874	Water supply	votes: 9,835 for, 34,424 against
Liverpool	1879	Water supply	votes: 21,455 for, 18,853 against
Lowestoft	1896	Purchase water, gas and market company	votes: 2,001 for, 895 against
Maidstone	1896	Purchase of water company	votes: 1,427 for, 3,489 against
Melton Mowbray	1885	Water supply	votes: 309 for, 525 against
Reading	1886	Enlarge boundaries and more powers for water / sewers	votes: 3,885 for, 2,005 against; voters: 3,008 for, 1,548 against
Sheffield	1873	Water supply	votes: 11,401 for, 5,979 against
Sheffield	1878	General improvements	votes: 11,770 for, 15,390 against
Sheffield	1887	Water supply	votes: 25,641 for, 3,604 against
Sunderland	1885	Improvement bill, including sanitary measures	votes: 6,363 for, 5,004 against; voters: 5,443 for, 4,444 against
Tynemouth	1891	Purchase water company	votes: 2,117 for, 2,206 against
Warrington	1890	Purchase water company	votes: 2,488 for, 1,685 against
Wigan	1905	General improvements	votes: 2,128 for, 1,864 against

Note: See text for discussion of how information was collected and plebiscites selected.

C Additional Historical Background

C.1 Local Council Elections

The municipal councils controlling decision-making consisted of councilors elected by the electorate discussed in the text.[62] Councilors were appointed for a period of three years, with one-third of the council up for re-election on November 1 of each year. Larger boroughs were divided into wards, with councilors elected separately for each ward. The councilors would then appoint aldermen for a six year term and a mayor for a one year term. Prior to 1882 the latter position was restricted to those already councilors or aldermen, but then open to any individual qualified for such a position. The mayor (or in his absence the aldermen) would hold a casting vote in council meetings. The mayor, or the relevant alderman for each ward, would also preside over elections. Elections were carried out using signed ballot papers until the 1872 Ballot Act implemented the secret ballot in both Parliamentary and local elections.

There were no term limits, and in some cases councilors served for decades. Significant property qualifications were in place for both councilors and aldermen. In larger boroughs, they had to own £1,000, or occupy property of £30, while in smaller boroughs the amounts were £500 and £15 respectively (Keith-Lucas, 1952, p.156). These requirements were essentially removed by the 1882 Municipal Corporations Act, which allowed any person on the burgess roll to act as either a councilor or alderman.

Following the 1835 Act, the following procedure was used to draw up the list of qualified voters. Parish overseers would draw up a list of burgesses in their parish. The list was then published, and objections could be made. After 1878 a simpler system was implemented in those boroughs represented in Parliament, whereby registration lists were drawn up alongside those in Parliament. Under this system Revising Barristers, rather than local assessors, held

[62]The discussion in this section draws heavily on Keith-Lucas (1952), particularly pp. 134–135.

responsibility for revising the overseers' lists. After 1888 this revised system was implemented in all boroughs.

C.2 Parliamentary versus Municipal Elections

The restrictions on the municipal franchise differed from those governing the right to vote in Parliamentary elections. In Parliamentary elections prior to 1867, the right to vote in boroughs (town constituencies) was restricted to those occupying property worth more than £10 rental value per annum, but no such restriction was in place for municipal elections. However, other restrictions were were more severe for municipal elections: to qualify for the municipal franchise voters must have been resident for at least three years (rather than one year for Parliamentary voting), and had to have paid local taxes for at least two and a half years (rather than 6 months). These differences, combined with the fact that citizens not qualifying for the Parliamentary franchise were poorer, and hence less likely to meet the tax paying requirement, meant that in practice the municipal franchise was more restricted then the municipal—by approximately 15% in a sample of 39 towns in 1835 (Keith-Lucas, 1952, p.61).

Some, but not all, of the municipal boroughs were represented in Parliament. At the start of our period, 112 of the 150 towns in the main analysis had Members of Parliament elected for the town—it is this set which have information available regarding the rental distribution used in Section 5.2.

C.3 Legislation Affecting the Municipal Franchise

This Appendix summarizes the major pieces of legislation affecting the municipal franchise between 1835 and 1900.

1835 Municipal Corporation Act: Established the structure of municipal councils in 178

towns with historic charters, with unincorporated towns allowed to petition for incorporation at a later date. Under the terms of this Act, councils were chosen under a system of annual elections (with one third of councilors replaced each year) by an electorate consisting of all male householders subject to residence and tax-paying requirements. Prior to 1835 female householders were able to vote in some towns, but were disenfranchised by the Act. In order to vote citizens had to have resided in the relevant municipal borough for three years and paid local property taxes (the "rates") for 2.5 years prior to the election. This included a stipulation that individuals were ineligible to vote if they had received poor relief in the twelve months prior to an election. Precisely, they had to have occupied a property (e.g., a house or shop) in the town and lived within seven miles of the borough.

1850 Small Tenements Rating Act: This Act gave local authorities the ability to collect taxes directly from landlords for poorer tenants, on the condition that the tenants were granted the municipal franchise. This practice was known as "compounding", with the tenants whose taxes were collected in this way known as "compounders". In particular, the Act applied to those in tenements of annual rental value of 6 pounds or under. This decision was not taken by the municipal council, but by the local vestry, who held responsibility for tax collection.

1869 Assessed Rates Act: This Act enshrined the right of compounders to vote.

1869 Municipal Franchise Act: This Act reduced the period of residency from three years to one—and the length of tax-paying required from two and half years to six months. The Act also enfranchised female householders aged 30 or older.

1869 Municipal Franchise Act: This Act reduced the period of residency from three years to one—and the length of tax-paying required from two and half years to six months. The Act also enfranchised female householders aged 30 or older.

1878 Parliamentary and Municipal Registration Act: This Act clarified the registration rules for both Parliamentary and Municipal elections. Of particular relevance to this

paper, this including further clarification that all "compounders" (see above) had the right to vote.

1882 Municipal Corporations Act: Consolidating Act bringing together several previous small amendments to the 1835 Municipal Corporations Act. In addition, it allowed that "every person qualified to elect councillors was also qualified to be elected" (Keith-Lucas, 1952, p.167). Revisions were also made to the system for registering voters for those boroughs represented in Parliament, as discussed above.

1888 County Electors Act: Allowed for occupiers of vacant land over 10 pounds to be granted the right to vote, as long as they paid assessed taxes and had resided in the borough for six months prior to the election. The simpler registration system implemented in Parliamentary Boroughs in 1878 was now implemented in all boroughs.

D Variation in the Extent of the Franchise

This Appendix investigates variation in the extent of the franchise in more detail. I start by analyzing the sources of variation before the 1869 reform, identifying in particular the role of legislation affecting the compounders that paid tax indirectly through their landlord.

D.1 Variation Before the 1869 Reforms

Table A.VII provides evidence that the extent of the franchise was correlated with the prevalence of indirect tax payment, but was not affected by the demand for town expenditure. A higher franchise before 1869 was associated with a higher proportion of "compounders"—renters paying their taxes through their landlord—in the municipal electorate. The change in the franchise however was negatively correlated with the pre-reform enfranchisement of these poor renters: suggestive evidence that the effect of the 1869 and 1878 reforms was to enfranchise these poor renters. We can also see that urban crowding, which plausibly reflects poverty, is associated with a lower franchise before 1869.[63]

There is no evidence that the level or the change in the franchise is associated with the pre-STRA town tax base, the magnitude of town spending before the STRA, or the share of the population working in agriculture (a proxy for industrial demand for public goods). The coefficients on all three variables are consistently insignificant, and small, across all seven specifications. The pre-reform party affiliation of the town mayor also does not appear to have affected the size of the "shock" to the franchise (specification 7)—evidence that elites could not limit the effects of the reform.

[63]However, this variable could also be capturing a smaller proportion of men being household heads.

Table A.VII: Indirect tax payment was a major determinant of variation in the franchise.

	Dependent Variable						
	1866 Male Franchise			DV=Δ Male Franchise 1866-79			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Compounders (% Electors)		4.35***	4.40***		-3.49***	-3.93***	-3.02**
		(0.980)	(1.001)		(1.108)	(1.143)	(1.313)
Population (Log)	-1.44	-2.37	-2.19	2.29	2.80	3.13*	3.11
	(1.785)	(1.563)	(1.559)	(2.036)	(1.879)	(1.867)	(2.577)
Population Growth	-0.17	0.15	0.47	1.00	0.86	0.35	0.17
	(1.995)	(1.801)	(1.986)	(2.087)	(2.019)	(2.185)	(3.451)
Urban Crowding	-4.25***	-3.42***	-3.02***	-0.14	-0.78	-1.57*	-1.70
	(0.797)	(0.741)	(0.690)	(1.010)	(1.105)	(0.927)	(1.031)
% Agriculture	0.80	0.12	0.46	-0.97	-0.59	-0.35	-2.48
	(1.661)	(1.504)	(1.502)	(1.720)	(1.631)	(1.641)	(2.204)
1850 Tax Base p.c.	-0.11	0.01	0.30	-0.98	-1.09	-1.05	-1.57
	(0.929)	(0.760)	(0.789)	(0.930)	(0.851)	(0.877)	(1.208)
Spend p.c. pre-STRA			-0.98			0.89	0.98
			(0.873)			(0.843)	(1.593)
Mayor Conservative							-0.39
							(2.408)
No. Towns	148	148	141	143	143	136	87
R^2	0.24	0.35	0.34	0.10	0.17	0.19	0.24

Robust standard errors in parentheses. The dependent variable in specifications 1–3 is the level of the male franchise in 1866, and in specification 4–7 is the change in the male franchise between 1866 and 1879 (i.e., following the 1869 and 1878 reforms). *Compounders (% Electors* is the proportion of municipal electors reported to be paying their rent through their landlord in 1866. Coefficients for all continuous variables are standardized. The table includes only towns that were also Parliamentary Boroughs, due to data availability. Mayor's party affiliation was collected from local newspaper sources, and so is only available for a subset of towns.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

As an alternative way to test whether the 1869 reforms were associated with the poor gaining the vote, I analyze the composition of the electorate before and after the reforms. Unfortunately we do not have information directly on the composition of the electorate. However, we can glean some insight by comparing the representation of Parliamentary voters in the electorate before the election, the most citizens could only vote in parliamentary elections if they occupied a property of at least £10 annual rental value. In 1866 this requirement excluded, on average, around two-thirds of citizens.

If extensions of the municipal franchise increased the representation of relatively poor

citizens, then the rich would be more over-represented in the electorate the smaller the franchise. I measure the over-representation of the wealthy through comparing the percentage of parliamentary voters in the municipal electorate to the percentage of parliamentary voters in the entire population:

$$\text{Over-representation} = \frac{\%\text{ Parliamentary electors in municipal electorate}}{\%\text{ Parliamentary electors in population}} \tag{8}$$

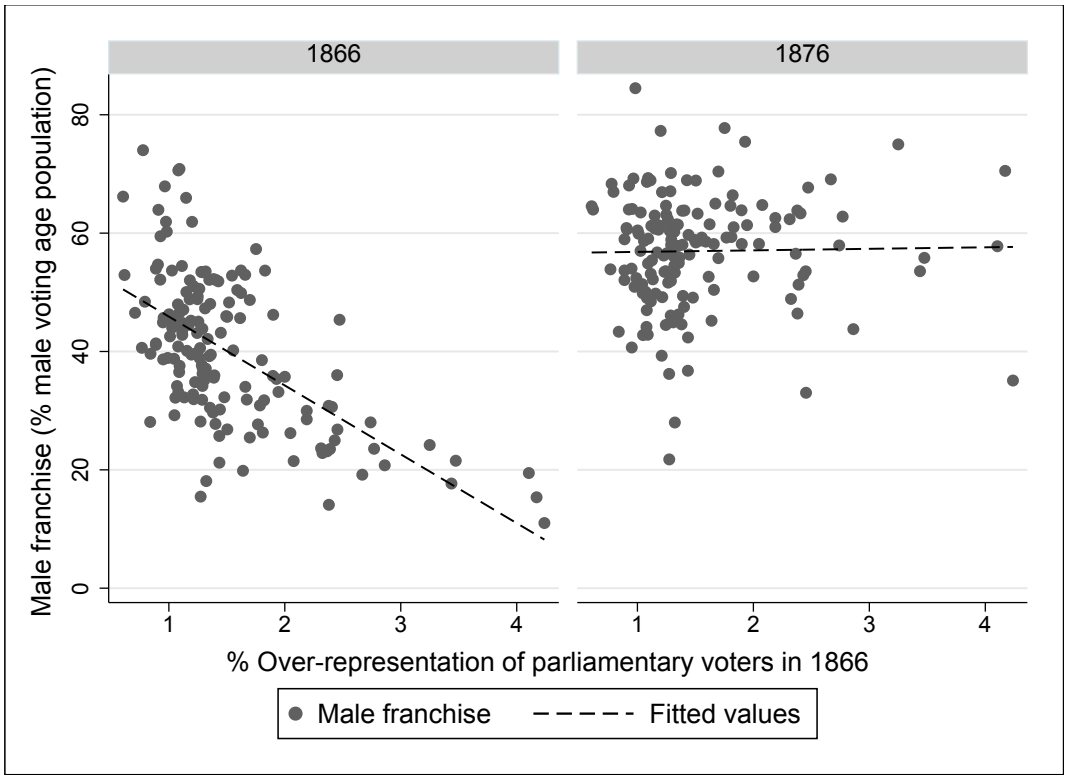
where "population" refers to the number of male occupiers in the town—that is the potential electorate under the male household franchise. If the electorate were entirely representative, the measure would equal one. If the wealthy were over-represented, on the other hand, then the number will be greater than one.

In 1866 there was a clear negative relationship between the extent of over-representation and the extent of the municipal franchise, as shown in the left hand panel of Figure A.VI, This relationship indicates that the electorate was more representative of relatively poor citizens when the franchise was higher. After the reforms of 1869, however, the downward-sloping relationship had disappeared—in 1876 there is no relationship between the extent of the franchise and the make-up of the pre-reform electorate. Further, the largest increases in the franchise occurred in those towns where the parliamentary electors were most over-represented, providing further evidence that the effects of the reforms was to extend the vote to poorer citizens.

D.2 Enfranchisement of Poor Voters

I estimate the proportion of "poor" households in the voting population using data on the distribution of housing values in the towns represented in Parliament, reported in the 1866 Electoral Returns and subsequent Parliamentary Papers (House of Commons *Parliamentary Papers*, 1866a,c,b). Specifically these papers report the number of houses at different gross

Figure A.VI: Over-representation of wealthier citizens predicts extent of franchise before, but not after 1869 reforms.



Over-representation of parliamentary voters denotes the extent to which citizens qualifying to vote in Parliament were over-represented in the municipal electorate (see Equation 8). After the 1869 reforms there is no evidence that these wealthier citizens were over-represented amongst the electorate. Source: Author's calculations using data from House of Commons (1866), and municipal franchise series (see Appendix B).

rental values—that is, the value at which it was estimated the property could be rented for a 12 month period (*communibus annis*). The rental value information is highly disaggregated, with information on the number of occupiers renting property split into 27 bins: under £4, at £1 intervals to £20 (and also at £10 exactly), at £10 intervals to £100 and over £100. I assume that rental values were uniformly distributed within each bin.

The distribution of rental value in the reports is particularly apposite for our purposes, since it relates to male occupiers—precisely the category of potential voters in the main franchise measure. The data was collected to examine the potential effect of altering the

rental value at which the Parliamentary vote was gathered, and so was based on identifying possible additions to the electorate. Individuals occupying two properties were, for instance, included only once (at the maximum of the two values).

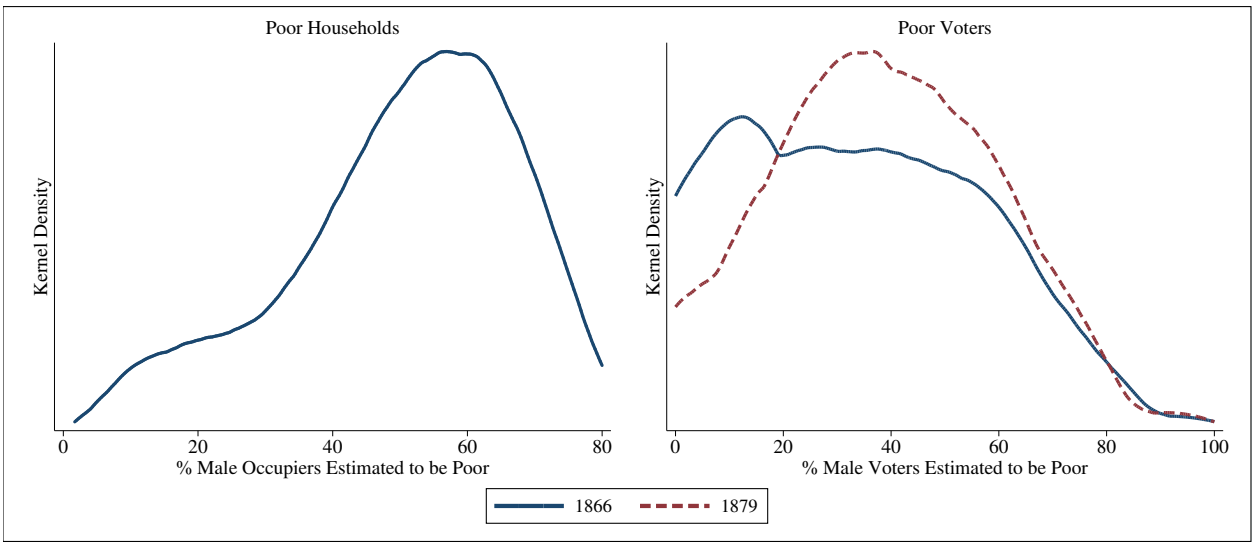
The way in which these values were assessed means that they provide an accurate estimate of property values. Property values in Britain were assessed at least once per year, since they formed the basis of local taxation. Tax assessments were carried out by local parish officials, and then confirmed by an Assessment Committee at the level of the Poor Law Union. This latter stage was implemented in the early 1860s to address concerns that parishes were distorting values to reduce the tax burden. Further, to the extent that values were distorted prior to this date, it was through allowing considerable deductions (for repairs, insurance and other expenses) in assessing the "rateable" value on which tax was determined.

To estimate the proportion of the population that are working class, I use information from household budgets in Horrell (1996, particularly Tables 1 and 5). These budgets report the household expenditure and rents of 7 occupational groups across a diverse mix of geographical locations between 1840 and 1854. Two of the occupational groups are agricultural: I remove these, and then estimate the average rent paid by working classes, weighted by occupation.[64]—providing an estimate of £7.2 per annum. I then define poor households as those paying a rent lower than this value—the resulting distribution across towns is displayed in the left hand panel of Figure A.VII.

The proportion of these poor households in the town electorate is then calculated on the basis of two assumptions. First, that all compounders are poor (the percentage of the town voters that are compounders in 1866 is reported in House of Commons *Parliamentary Papers* (1866a)). Second, I assume that, apart (potentially) from compounders, the franchise is extended in descending order of income. In other words, I assume the poor are enfranchised

[64]Occupational shares are given in Horrell (1996, fn. 38).

Figure A.VII: Variation in the estimated proportion of poor households and poor voters across time.



Note: The left hand panel displays the percentage of households in those towns estimated to be poor in 1866. The right hand panel displays the percentage of municipal voters in these towns estimated to be poor before and after the reforms. Data is displayed only for those towns included in the main analysis in Section 5: a total of 112 towns. See text for data sources and estimation details.

only when the extent of the franchise is greater than the share of non-poor voters in the town. As the franchise grows over time, this threshold is crossed in an increasing proportion of towns. As shown in the right hand panel of Figure A.VII, there is a clear rightward shift in the distribution of this variable following the reforms in 1869 and 1878.

As a sanity check, I re-estimate the regressions in Table V re-defining "poor" as those below the median household income in 1860 estimated by MacKenzie (1921). She estimates that 18% of households worked in agriculture, so this value translates into approximately the sixth decile of urban households. Her standard household at this income level included 3 children, with an income of £53 and rental spending of £7.8 per annum. I carry out a robustness test using this alternative threshold in the following subsection.

Further reassurance that these estimates are reasonable is that living in a dwellings of over £6 rateable value was frequently used as a potential "lower limit" for obtaining the

Parliamentary franchise in the 1850s and seen as a bulwark against providing the working classes with democratic control (Seymour, 1915). On average across Parliamentary boroughs the rateable value was around 18% less than the rental value (calculations using House of Commons, 1866, Return F); and so the poverty definition above is in line with this threshold.

D.3 Robustness Tests

The results in the main text are robust to inclusion of alternative controls, alternative definition of poor voters, and varying the definition of the periods in which enfranchisement is allowed to take effect.

Table A.VIII repeats the specifications from Table **??** with the addition of controls for the tax base per capita (specification (3)) and the lagged dependent variable (specification (5)). The findings are largely unchanged, except that the effect size is smaller when controlling for the lagged dependent variable (as expected, since doing so reduces unexplained variation in the variable of interest).

Table A.VIII presents the effect of re-estimating the specifications with the alternative definition of poor voters, defined using MacKenzie (1921) and discussed above. The results are extremely similar to those with the main results (that is, using the definition based on Horrell (1996)). In some ways this is not that surprising since the alternative poverty thresholds differ by less than 10%; however it demonstrates that the results are not sensitive to small changes in the way the poverty threshold is defined.

As a more stringent test of robustness to the poverty definition, in Table A.X I re-estimate the results again, defining households as poor only if their rental income is less than 80% of the threshold in my primary definition. The results are in line with the theoretical prediction that the negative effect of adding even poorer voters should remain if we define poverty more stringently, with the coefficients for the second period consistently higher than those in the main specification. The same is generally true for the first period, except when

including town size time trends or limiting the sample. We must be cautious with these results given the small sample—only 12 towns are "treated" (compared to 29 in the main regressions)—but they at least demonstrate that the findings are not an artefact of the way "poor" households are defined.

Finally, Table A.XI shows that the results are not dependent on the specific periods into which I split the treatment. Here, I identify four windows: a pre-reform period of 1867–69, an intermediate period 1870–1873, and two post-reform periods (shorter than the main analysis), also 4 years in length, of 1874–1877 and 1878–1881. The "intermediate" period here is immediately after the main reform, but I largely include the relevant years as "pre-reform" in the main analysis on the basis that the new electorate would take time to have an effect on council decisions. By varying that definition here, I check whether the main findings are driven either by the inclusion of post-reform years in the "pre-treatment" period. Shortening the total period also allows me to check that the findings are not driven by events more than 12 years after the most important reform in 1869.

The results of these specifications is consistent with the main findings, although the smaller treatment windows lead to noisier estimates. In the main specifications ((1) and (7)) the coefficients for last two periods are negative and statistically significant at a 5% level, while the coefficient for the first post-reform period is zero or weakly negative—consistent with a weaker effect in these early years as the new electorate takes time to have an effect. Coefficients in robustness checks are similar, although in some cases lose statistical significance at conventional levels—consistent with greater noise due in the smaller analysis windows. Together, the specifications demonstrate that the findings in Table **??** are not a consequence of the specific way in which the treatment windows have been defined.

Finally, Table A.XII repeats the analysis using a continuous measure of the change in the enfranchisement of the poor voters, than the binary indicator used previously. The results are again similar, with negative coefficients in both periods. In contrast to the main results,

the coefficient in the first period is not always statistically distinguishable from zero at conventional levels. This noisiness is again not surprising, given the extent of approximation in constructing the level of poor enfranchisement.

Table A.VIII: Results in Table V are robust to inclusion of additional control variables.

	Dependent Variable (per Capita, % of Median):											
	Public Goods Spend						Tax Receipts					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Poor Enfranchised	-0.14**	-0.14**	-0.09	-0.07	-0.09**	-0.18*	-0.10***	-0.10***	-0.08**	-0.08**	-0.06***	-0.12***
x 1873–78	(0.068)	(0.069)	(0.069)	(0.059)	(0.042)	(0.093)	(0.038)	(0.037)	(0.033)	(0.036)	(0.022)	(0.045)
Poor Enfranchised	-0.23***	-0.23**	-0.16**	-0.16*	-0.11**	-0.26**	-0.11**	-0.11**	-0.08*	-0.09**	-0.06**	-0.12**
x 1879–84	(0.085)	(0.089)	(0.079)	(0.082)	(0.054)	(0.112)	(0.045)	(0.046)	(0.044)	(0.044)	(0.027)	(0.054)
Sample	All	All	All	All	All	Limited STRA	All	All	All	All	All	Limited STRA
No. Observations	1789	1789	1756	1789	1683	1157	1789	1789	1756	1789	1683	1157
No. Towns	102	102	102	102	102	66	102	102	102	102	102	66
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Occupation Controls	N	Y	Y	N	N	N	N	Y	Y	N	N	N
Tax Base Per Capita	N	N	Y	N	N	N	N	N	Y	N	N	N
Period x Decade FE	N	N	N	Y	N	N	N	N	N	Y	N	N
Lagged DV	N	N	N	N	Y	N	N	N	N	N	Y	N

Note: Independent variables are dummies reflecting whether the estimated share of poor voters in the electorate increased between 1866 and 1879 (based on (Horrell, 1996); see Appendix D.2 for details). The "Limited STRA" sample excludes towns where the Small Tenements Rating Act was fully in place in 1866. "Demographic controls" include town population (in six bins), urban crowding, decadal population growth, and female franchise. "Occupational controls" include the % of the population engaged in agriculture, the % in commerce, and the % of men over 20 that are heads of household. "Population x Period FE" allows time trends to vary by period across population groups. Standard errors are clustered by town and displayed in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.IX: Results in Table V are similar using alternative definition of poor voters.

	Dependent Variable (per Capita, % of Median):											
	Public Goods Spend						Tax Receipts					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Poor Enfranchised	-0.14**	-0.13*	-0.08	-0.09	-0.09**	-0.18*	-0.11***	-0.11***	-0.09***	-0.10***	-0.06***	-0.12***
x 1873–1878	(0.069)	(0.070)	(0.069)	(0.062)	(0.042)	(0.093)	(0.037)	(0.037)	(0.032)	(0.036)	(0.022)	(0.045)
Poor Enfranchised	-0.23***	-0.22**	-0.16**	-0.16**	-0.12**	-0.26**	-0.11**	-0.11**	-0.09**	-0.10**	-0.05**	-0.12**
x 1879–1884	(0.084)	(0.088)	(0.078)	(0.081)	(0.053)	(0.112)	(0.044)	(0.045)	(0.043)	(0.043)	(0.027)	(0.054)
Sample	All	All	All	All	All	Limited STRA	All	All	All	All	All	Limited STRA
No. Observations	1789	1789	1756	1789	1683	1157	1789	1789	1756	1789	1683	1157
No. Towns	102	102	102	102	102	66	102	102	102	102	102	66
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Occupation Controls	N	Y	Y	N	N	N	N	Y	Y	N	N	N
Tax Base Per Capita	N	N	Y	N	N	N	N	N	Y	N	N	N
Population x Period FE	N	N	N	Y	N	N	N	N	N	Y	N	N
Lagged DV	N	N	N	N	Y	N	N	N	N	N	Y	N

Note: Independent variables are dummies reflecting whether the estimated share of poor voters in the electorate increased between 1866 and 1879 —in this case defining poverty using MacKenzie (1921) rather than Horrell (1996). The "Limited STRA" sample excludes towns where the Small Tenements Rating Act was fully in place in 1866. See Table A.VIII for details of control variables. Standard errors are clustered by town and displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.X: Results in Table V are similar when focusing on very poor voters.

	Dependent Variable (per Capita, % of Median):											
	Public Goods Spend						Tax Receipts					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Poor Enfranchised	-0.12	-0.12	-0.06	-0.03	-0.07	-0.13	-0.13*	-0.13*	-0.10**	-0.10	-0.07*	-0.14*
x 1873–1878	(0.083)	(0.081)	(0.072)	(0.074)	(0.046)	(0.111)	(0.069)	(0.067)	(0.044)	(0.073)	(0.037)	(0.076)
Poor Enfranchised	-0.27**	-0.27**	-0.18**	-0.22**	-0.13**	-0.29**	-0.21***	-0.21***	-0.17***	-0.19***	-0.12***	-0.22***
x 1879–1884	(0.113)	(0.109)	(0.091)	(0.109)	(0.063)	(0.145)	(0.064)	(0.062)	(0.054)	(0.066)	(0.040)	(0.071)
Sample	All	All	All	All	All	Limited STRA	All	All	All	All	All	Limited STRA
No. Observations	1789	1789	1756	1789	1683	1157	1789	1789	1756	1789	1683	1157
No. Towns	102	102	102	102	102	66	102	102	102	102	102	66
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Occupation Controls	N	Y	Y	N	N	N	N	Y	Y	N	N	N
Tax Base Per Capita	N	N	Y	N	N	N	N	N	Y	N	N	N
Population x Period FE	N	N	N	Y	N	N	N	N	N	Y	N	N
Lagged DV	N	N	N	N	Y	N	N	N	N	N	Y	N

Note: Independent variables are dummies reflecting whether the estimated share of poor voters in the electorate increased between 1866 and 1879 —in this case defining poverty using 80% of the poverty line used in the main results. The "Limited STRA" sample excludes towns where the Small Tenements Rating Act was fully in place in 1866. See Table A.VIII for details of control variables. Standard errors are clustered by town and displayed in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.XI: Results in Table V are similar with shorter treatment periods.

	Dependent Variable (per Capita, % of Median):											
	Public Goods Spend						Tax Receipts					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Poor Enfranchised	0.01	0.02	0.00	0.03	-0.06	-0.04	-0.05	-0.04	-0.03	-0.05	-0.04	-0.05
x 1870–1873	(0.051)	(0.051)	(0.053)	(0.046)	(0.049)	(0.070)	(0.034)	(0.034)	(0.038)	(0.034)	(0.037)	(0.037)
Poor Enfranchised	-0.13	-0.13	-0.10	-0.04	-0.12*	-0.19	-0.11**	-0.11**	-0.08	-0.09*	-0.07	-0.13**
x 1874–1877	(0.084)	(0.087)	(0.092)	(0.069)	(0.074)	(0.119)	(0.051)	(0.052)	(0.052)	(0.049)	(0.043)	(0.058)
Poor Enfranchised	-0.23**	-0.22**	-0.18*	-0.12	-0.18**	-0.28**	-0.12**	-0.11**	-0.08	-0.10*	-0.07	-0.13**
x 1878–81	(0.093)	(0.099)	(0.100)	(0.080)	(0.074)	(0.123)	(0.053)	(0.055)	(0.060)	(0.052)	(0.042)	(0.063)
Sample	All	All	All	All	All	Limited STRA	All	All	All	All	All	Limited STRA
No. Observations	1483	1483	1450	1483	1377	959	1483	1483	1450	1483	1377	959
No. Towns	102	102	102	102	102	66	102	102	102	102	102	66
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Occupation Controls	N	Y	Y	N	N	N	N	Y	Y	N	N	N
Tax Base Per Capita	N	N	Y	N	N	N	N	N	Y	N	N	N
Population x Period FE	N	N	N	Y	N	N	N	N	N	Y	N	N
Lagged DV	N	N	N	N	Y	N	N	N	N	N	Y	N

Note: Independent variables are dummies reflecting whether the estimated share of poor voters in the electorate increased between 1866 and 1879. The "Limited STRA" sample excludes towns where the Small Tenements Rating Act was fully in place in 1866. See Table A.VIII for details of control variables. Standard errors are clustered by town and displayed in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.XII: Results are similar when using a continuous measure of the change in the share of poor voters.

	Dependent Variable (per Capita, % of Median):											
	Public Goods Spend						Tax Receipts					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Δ % Poor Voters	-0.03	-0.03	-0.03	-0.03	-0.03	-0.04	-0.03**	-0.03**	-0.03**	-0.03**	-0.03**	-0.03*
x 1873–78	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.032)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.017)
Δ % Poor Voters	-0.03	-0.03	-0.03	-0.03	-0.03	-0.04	-0.03**	-0.03**	-0.03**	-0.03**	-0.03**	-0.03**
x 1879–84	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.036)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.019)
Sample	All	All	All	All	All	Limited STRA	All	All	All	All	All	Limited STRA
No. Observations	1789	1789	1789	1789	1789	1157	1789	1789	1789	1789	1789	1157
No. Towns	102	102	102	102	102	66	102	102	102	102	102	66
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Occupation Controls	N	Y	Y	N	N	N	N	Y	Y	N	N	N
Tax Base Per Capita	N	N	Y	N	N	N	N	N	Y	N	N	N
Population x Period FE	N	N	N	Y	N	N	N	N	N	Y	N	N
Lagged DV	N	N	N	N	Y	N	N	N	N	N	Y	N

Note: Independent variables are continuous variables estimating the change in the share of poor voters in the electorate between 1866 and 1879 (replacing the binary measure in Table V). The "Limited STRA" sample excludes towns where the Small Tenements Rating Act was fully in place in 1866. See Table A.VIII for details of control variables. Standard errors are clustered by town and displayed in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

E Robustness of Inverted-U-Relationship

This appendix presents additional robustness tests of the inverted-shape-relationship shown in Section 5.1. First, fractional polynomial regressions demonstrate that the inverted-U-relationship is robust to allowing for more flexible parametric reforms than the quadratic regressions reported in the main text. Second, additional quadratic specifications show that the results are robust to the inclusion of alternative control variables, and to varying the sample of towns included in the analysis.

E.1 Fractional Polynomial Regressions

The inverted-U-shape is robust to allowing for a more flexible parametric form than the quadratic specification presented in the main text. In particular, I model $g(x)$ in equation 1 using a fractional polynomial (Royston and Altman, 1994) of up to two dimensions. This approach allows for a much wider range of non-linear shapes than achieved with the traditional quadratic relationship—not imposing symmetry, and allowing for variation in the parametric form across specifications.[65] In place of the U-test of Lind and Mehlum (2010) used in the quadratic specifications, I implement a cluster bootstrap test of whether there is an internal turning point by re-estimating the fractional polynomial specification with each bootstrap sample—choosing the two-degree specification with the lowest model deviance in each case.[66] The p-value is then calculated as the percentage of bootstrap samples for which the turning point is within the observed distribution of the franchise. This approach allows for the uncertainty in the model imposed when estimating the relationship, and so provides

[65] Specifically, the approach compares the fit of models based on choosing from a set of fractional powers, as well as allowing for logarithmic relationships. Following Royston and Altman (1994), I allow the degrees to be chosen from the set {-2,-1,-0.5,0,0.5, 1, 2 ,3}, where a degree of 0 refers to $log(x)$, and non-zero degrees refer to exponents.

[66] Specifically, for each bootstrap sample, the turning point is classified as internal if both a linear function is rejected in favor of 2 degree fractional polynomial at a 10% significance level, and the estimated 2 degree polynomial implies a turning point within the range of the franchise data.

a very strong test of the inverted-U-relationship.

Table A.XIII shows that the inverted-U-relationship is supported for the three variables discussed above. In our case, the best fitting model for total public goods expenditure in our main specification (1) is actually the quadratic function used in the main text. The shape is slightly different for the tax and sanitation expenditure dependent variables, but the turning points and effect magnitudes remain similar to those in the main text. Again, there is no evidence of any relationship with the property receipts: the inverted-U-shape is not a result of allowing "too much" flexibility in parametric form.

Table A.XIV shows the same fractional polynomial specifications for the analysis with the data split into 5 year periods (as in Table IV). Again the results are similar to those using the main specification. The inverted-U-shape emerges clearly from the data, and is not an artefact of the quadratic functional form.

Table A.XIII: Inverted-U-Shape is robust to flexible parametric form.

	Dependent Variable (per Capita, % of Median):							
	Public Goods Spend		Tax Receipts		Sanitation Spend		Property Receipts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Inverted-U-Shape								
Turning Point (%)	52	53	44	42	45	45	40	39
F-test (p-val)	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.86
U-test (p-val)	0.01	0.02	0.01	0.03	0.12	0.20	0.47	0.60
Δ in Dependent Variable:								
Increase ($fran \leq T$)	44	42	15	11	34	20	-	-
Decrease ($fran \geq T$)	37	28	37	31	50	43	-	-
Panel B: Regression Details								
Powers of Fractional Polynomial Model								
1st Degree	1	.5	.5	-1	.5	0	-2	-.5
2nd Degree	2	2	3	3	.5	0	-2	-.5
Coefficients on Male Franchise Terms:								
1st Degree	0.47***	1.20***	0.38***	-0.81**	7.77***	2.79**	19.42	-4.16
	(0.124)	(0.344)	(0.137)	(0.319)	(2.844)	(1.222)	(22.862)	(7.923)
2nd Degree	-0.05***	-0.02***	-0.00***	-0.00***	-2.21***	-0.97***	-21.82	-6.39
	(0.012)	(0.007)	(0.000)	(0.000)	(0.769)	(0.363)	(28.981)	(11.751)
No. Observations	4856	4811	4856	4811	4181	4143	4221	4183
No. Towns	150	149	150	149	150	149	150	149
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y	Y	Y
Occupation Controls	N	Y	N	Y	N	Y	N	Y
Tax Base per Capita	N	Y	N	Y	N	Y	N	Y

Note: Panel A shows the details of the inverted-U-shape estimated from the fractional polynomial specifications using annual financial data for 1867–1900. "F-test" relates to a test of joint significance of the two franchise variables. U-test relates to cluster bootstrap of inverted-U-shape explained in text. Franchise coefficients represent the effect of a 10% increase in the franchise (lagged 3 years). See notes to Table III for details of control variables. Standard errors are clustered by town and displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

E.2 Additional Quadratic Specifications

This subsection presents additional results using the quadratic specifications. First, Table A.XV and Table A.XVI display the full regression results for Table III and Table IV

Table A.XIV: Fractional Polynomials with Data in 5-year Periods

	Dependent Variable (per Capita, % of Median):			
	Public Goods Spend		Tax Receipts	
	(1)	(2)	(3)	(4)
Panel A: Inverted-U-Shape				
Turning Point (%)	53	55	45	46
F-test (p-val)	0.00	0.00	0.00	0.00
U-test (p-val)	0.01	0.04	0.02	0.06
Δ in Dependent Variable:				
Increase ($fran \leq T$)	50	50	14	9
Decrease ($fran \geq T$)	43	33	40	33
Panel B: Regression Details				
Powers of Fractional Polynomial Model				
1st Degree	2	1	1	2
2nd Degree	2	3	3	3
Coefficients on Male Franchise Terms:				
1st Degree	0.13***	0.29***	0.13***	0.02**
	(0.036)	(0.089)	(0.047)	(0.009)
2nd Degree	-0.06***	-0.00***	-0.00***	-0.00***
	(0.016)	(0.001)	(0.001)	(0.001)
No. Observations	971	943	971	943
No. Towns	150	149	150	149
Year Fixed Effects	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y
Occupation Controls	N	Y	N	Y
Tax Base per Capita	N	Y	N	Y

Note: Panel A shows the details of the inverted-U-shape estimated from the fractional polynomial specifications using financial data for 1867–1900 split into 5 year periods. "F-test" relates to a test of joint significance of the two franchise variables. U-test relates to cluster bootstrap of inverted-U-shape explained in text. Franchise coefficients represent the effect of a 10% increase in the franchise (lagged 3 years). See notes to Table III for details of control variables. Standard errors are clustered by town and displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

respectively. Tables A.XVII and Tables A.XVIII show the robustness of the results to alternative control variables, including both those used in Figure II, and controlling for population using a quartic polynomial, rather than the categorical variable used in the main text. Ta-

bles A.XIX and Tables A.XX repeat the main specifications within subsamples of the main dataset. Finally, Table A.XXI shows that the lagged franchise is preferred to the current franchise in a "horse race" between the two variables.

These additional specifications consistently support the results in Section 5.1. Both the magnitude of the estimated effect and statistical significance of the relationship are largely similar to the main results. Inclusion of additional controls for town population (either as a quartic, or the inclusion of town–decade fixed effects) does reduces the estimated magnitude, but the estimated effects remain large: an increase of around 30% of the median spending on public goods up to the turning point, and a reduction of approximately 18% after it. Effects of the lagged dependent variable also lead to lower effect estimates: which could reflect the franchise variable (which is lagged three years) having an effect in previous years, or the fact that this leads to the loss of observations, particularly before the 1869 reforms.

The few subsamples in which the evidence of an inverted-U-shape is only weak are likely to be explained by limited data. The U-test is insignificant at conventional levels in three specifications: for taxation when limiting the sample to towns with franchise beneath the turning point in 1866 (specification (4) in Table A.XX, p-value=0.13), and for sanitation expenditure when limiting to a balanced panel or towns without boundary changes (specifications (2) and (3) in Table A.XIX, p-values 0.25 and 0.29). In both cases, the sample limitation excludes a lot of data, particularly in the early years of the analysis (recall that sanitation data is only available from 1872 onwards in any case), increasing noise in the estimates. Further, in both cases, the magnitude of the decrease after the turning point—for which the available data is less limited—remain large. Consequently, these results do not provide a major caveat to the conclusion that the relationship with the franchise and the size of government is inverted-U-shaped.

Table A.XV: Full Results for Quadratic Specifications in Table III.

	Dependent Variable (per Capita, % of Median):							
	Public Goods Spend		Tax Receipts		Sanitation Spend (from 1872 only)		Property Receipts (Placebo)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Male Franchise	0.47***	0.42***	0.24***	0.19***	0.46**	0.31	-0.33	-0.16
	(0.124)	(0.121)	(0.073)	(0.066)	(0.218)	(0.218)	(0.745)	(0.651)
Male Franchise Sq	-0.05***	-0.04***	-0.03***	-0.02***	-0.05**	-0.03*	0.03	0.02
	(0.012)	(0.011)	(0.007)	(0.007)	(0.019)	(0.018)	(0.075)	(0.067)
Female Franchise	-0.03	-0.04	0.03	0.01	-0.03	-0.04	-0.36	-0.20
	(0.082)	(0.075)	(0.049)	(0.050)	(0.096)	(0.092)	(0.546)	(0.482)
Tax Base per Capita		0.23***		0.14***		0.23***		0.58*
		(0.057)		(0.042)		(0.064)		(0.310)
Population:								
10k–25k	-0.15**	-0.10	-0.01	0.02	-0.02	0.05	-0.43	-0.60*
	(0.073)	(0.061)	(0.085)	(0.073)	(0.085)	(0.075)	(0.282)	(0.348)
25k–50k	0.03	0.10	-0.13	-0.09	0.03	0.11	1.16	0.98
	(0.153)	(0.138)	(0.110)	(0.095)	(0.184)	(0.166)	(2.170)	(1.853)
50k–100k	0.17	0.24	-0.02	0.03	0.21	0.26	0.71	0.63
	(0.196)	(0.176)	(0.129)	(0.113)	(0.236)	(0.214)	(2.137)	(1.899)
100k–250k	0.52*	0.58**	0.12	0.12	0.49	0.43	0.18	0.29
	(0.286)	(0.247)	(0.150)	(0.130)	(0.331)	(0.296)	(2.245)	(2.023)
>250k	1.34***	1.39***	0.47**	0.47***	1.56***	1.46***	0.14	0.49
	(0.349)	(0.300)	(0.194)	(0.156)	(0.352)	(0.331)	(2.314)	(2.347)
Urban Crowding	-0.24*	-0.16	-0.08	-0.01	-0.18	-0.10	-0.21	-0.37
	(0.126)	(0.120)	(0.065)	(0.062)	(0.126)	(0.114)	(0.407)	(0.299)
Population Growth	-0.02	-0.02	-0.05***	-0.05***	-0.01	-0.00	0.13	0.12
	(0.024)	(0.024)	(0.015)	(0.015)	(0.030)	(0.030)	(0.117)	(0.114)
% Men >20 House Heads		-0.10*		-0.03		-0.11		-0.64
		(0.061)		(0.041)		(0.067)		(0.437)
% in Agriculture		0.36**		0.30***		0.44**		-1.14
		(0.152)		(0.092)		(0.177)		(1.403)
% in Comm./Professions		0.22**		0.21***		0.37***		-0.76
		(0.100)		(0.070)		(0.106)		(0.644)
No. Observations	4856	4811	4856	4811	4181	4143	4221	4183
No. Towns	150	149	150	149	150	149	150	149
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y

Note: The table displays the full results for the quadratic specifications in Table III. Franchise variables reflect effect of 10% change in the relevant franchise; all other continuous variables are standardized. Standard errors are clustered by town and displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.XVI: Full Results for Regressions with 5 year periods.

	Dependent Variable (per Capita, % of Median):			
	Public Goods Spend		Tax Receipts	
	(1)	(2)	(3)	(4)
Male Franchise	0.59***	0.53***	0.28***	0.23***
	(0.155)	(0.154)	(0.083)	(0.078)
Male Franchise Sq	-0.06***	-0.05***	-0.03***	-0.03***
	(0.014)	(0.014)	(0.008)	(0.008)
Female Franchise	-0.06	-0.06	0.01	-0.01
	(0.092)	(0.085)	(0.059)	(0.062)
Tax Base per Capita		0.13**		0.11**
		(0.057)		(0.045)
Population:				
10k–25k	-0.17*	-0.12*	-0.01	0.01
	(0.086)	(0.071)	(0.099)	(0.080)
25k–50k	-0.01	0.05	-0.11	-0.08
	(0.162)	(0.146)	(0.123)	(0.104)
50k–100k	0.13	0.18	0.01	0.04
	(0.214)	(0.192)	(0.139)	(0.120)
100k–250k	0.40	0.44	0.15	0.13
	(0.322)	(0.282)	(0.162)	(0.139)
>250k	1.34***	1.45***	0.45**	0.48***
	(0.347)	(0.290)	(0.202)	(0.162)
Urban Crowding	-0.24*	-0.25*	-0.08	-0.02
	(0.138)	(0.135)	(0.075)	(0.072)
Population Growth	-0.03	-0.03	-0.06***	-0.06***
	(0.027)	(0.027)	(0.018)	(0.018)
% Men over 20 Heads of Household		-0.17**		-0.04
		(0.068)		(0.044)
% in Agriculture		0.44**		0.27**
		(0.173)		(0.104)
% in Commerce / Professions		0.29**		0.25***
		(0.111)		(0.076)
No. Observations	971	956	971	956
No. Towns	150	149	150	149
Year Fixed Effects	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y

Note: The table shows the full regression results from Table III. Franchise variables reflect effect of 10% change in the relevant franchise; all other continuous variables are standardized. Standard errors are clustered by town and displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.XVII: Quadratic Specifications with Additional Controls: Spending Dependent Variables

	Dependent Variable (per Capita, % of Median):											
	Public Goods Spend						Sanitation Spend (from 1872 only)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Inverted-U-Shape												
Turning Point (%)	52	54	53	52	54	50	48	52	47	46	48	48
F-test (p-val)	0.00	0.02	0.00	0.00	0.04	0.01	0.00	0.05	0.01	0.00	0.04	0.01
U-test (p-val)	0.00	0.01	0.00	0.00	0.02	0.01	0.04	0.05	0.07	0.08	0.08	0.10
Δ in Dependent Variable:												
Increase ($fran \leq T$)	44	32	44	42	30	11	34	34	27	26	26	12
Decrease ($fran \geq T$)	37	21	30	35	18	13	50	30	42	52	35	17
Panel B: Regression Details												
Male Franchise	0.47***	0.32***	0.44***	0.45***	0.29**	0.14***	0.46**	0.38*	0.37*	0.40*	0.33	0.16
	(0.124)	(0.118)	(0.120)	(0.126)	(0.114)	(0.050)	(0.218)	(0.208)	(0.211)	(0.229)	(0.205)	(0.109)
Male Franchise Sq	-0.05***	-0.03***	-0.04***	-0.04***	-0.03**	-0.01***	-0.05**	-0.04**	-0.04**	-0.04**	-0.03*	-0.02*
	(0.012)	(0.011)	(0.011)	(0.012)	(0.010)	(0.005)	(0.019)	(0.018)	(0.018)	(0.019)	(0.018)	(0.009)
No. Observations	4856	4856	4811	4786	4856	4695	4181	4181	4143	4180	4,181	4026
No. Towns	150	150	149	150	150	150	150	150	149	150	150	150
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Population Quartic	N	Y	N	N	N	N	N	Y	N	N	N	N
Occupation Controls	N	N	Y	N	N	N	N	N	Y	N	N	N
Tax Base per Capita	N	N	N	Y	N	N	N	N	N	Y	N	N
Population_x_Decade FE	N	N	N	N	Y	N	N	N	N	N	Y	N
Lagged DV	N	N	N	N	N	Y	N	N	N	N	N	Y

Note: See Table III for details of tests and vectors of control variables. Population dummies are excluded when the population quartic is included. Standard errors are clustered by town and displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.XVIII: Quadratic Specifications with Additional Controls: Revenue Dependent Variables

	Dependent Variable (per Capita, % of Median):											
	Tax Receipts						Property Receipts (Placebo)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Inverted-U-Shape												
Turning Point (%)	44	42	44	42	42	43	50	33	33	52	47	67
F-test (p-val)	0.00	0.01	0.00	0.00	0.04	0.00	0.90	0.92	0.92	0.88	0.74	0.62
U-test (p-val)	0.00	0.02	0.00	0.01	0.06	0.01	0.34	0.46	0.46	0.34	0.24	0.43
Δ in Dependent Variable:												
Increase ($fran \leq T$)	15	9	14	12	7	4	-	-	-	-	-	-
Decrease ($fran \geq T$)	37	28	33	35	25	12	-	-	-	-	-	-
Panel B: Regression Details												
Male Franchise	0.24***	0.16**	0.23***	0.21***	0.14*	0.07***	-0.33	-0.10	-0.11	-0.38	-0.54	-0.29
	(0.073)	(0.066)	(0.068)	(0.072)	(0.073)	(0.024)	(0.745)	(0.604)	(0.644)	(0.773)	(0.714)	(0.540)
Male Franchise Sq	-0.03***	-0.02***	-0.03***	-0.02***	-0.02**	-0.01***	0.03	0.01	0.02	0.04	0.06	0.02
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.002)	(0.075)	(0.060)	(0.065)	(0.077)	(0.073)	(0.052)
No. Observations	4856	4856	4811	4786	4856	4695	4221	4221	4183	4216	4221	4071
No. Towns	150	150	149	150	150	150	150	150	149	150	150	150
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Population Quartic	N	Y	N	N	N	N	N	Y	N	N	N	N
Occupation Controls	N	N	Y	N	N	N	N	N	Y	N	N	N
Tax Base per Capita	N	N	N	Y	N	N	N	N	N	Y	N	N
Population_x_Decade FE	N	N	N	N	Y	N	N	N	N	N	Y	N
Lagged DV	N	N	N	N	N	Y	N	N	N	N	N	Y

Note: See Table III for details of tests and vectors of control variables. Population dummies are excluded when the population quartic is included. Standard errors are clustered by town and displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.XIX: Quadratic Specifications in Subsamples: Spending Dependent Variables

	Dependent Variable (per Capita, % of Median):											
	Public Goods Spend						Sanitation Spend (from 1872 only)					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Inverted-U-Shape												
Turning Point (%)	51	50	53	56	52	51	48	41	37	46	49	46
F-test (p-val)	0.00	0.02	0.01	0.02	0.01	0.06	0.00	0.05	0.07	0.05	0.04	0.01
U-test (p-val)	0.00	0.01	0.00	0.02	0.00	0.02	0.03	0.25	0.29	0.14	0.08	0.10
Δ in Dependent Variable:												
Increase ($fran \leq T$)	69	41	38	45	37	29	42	8	6	24	31	34
Decrease ($fran \geq T$)	52	39	28	20	29	29	70	57	44	44	40	58
Panel B: Regression Details												
Male Franchise	0.42***	0.49**	0.40***	0.40***	0.39***	0.34**	0.43**	0.33	0.18	0.35	0.39	0.48
	(0.102)	(0.195)	(0.123)	(0.144)	(0.127)	(0.144)	(0.205)	(0.323)	(0.220)	(0.269)	(0.242)	(0.323)
Male Franchise Sq	-0.04***	-0.05***	-0.04***	-0.04***	-0.04***	-0.03**	-0.05***	-0.04	-0.02	-0.04*	-0.04*	-0.05*
	(0.010)	(0.018)	(0.011)	(0.014)	(0.012)	(0.014)	(0.017)	(0.029)	(0.020)	(0.023)	(0.021)	(0.028)
No. Observations	4911	2856	2673	3818	3884	3853	4201	2408	2299	2751	3345	3303
No. Towns	150	84	83	118	128	118	150	84	83	98	127	118
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note: The table replicates the analysis in Table III for various subsamples of the data. Subsamples are defined as follows for each dependent variable. (1) includes outliers of the franchise excluded in main regressions. (2) Only towns with data available in all years. (3) Excludes towns with boundary changes, or different town and sanitary authority boundaries in 1871. (4) Franchise below the estimated turning point for that dependent variable in 1866 (5) Exclude towns with population in top or bottom 10% of sample (6) Exclude towns with 1873 tax base per capita in top or bottom 10% of sample.
See Table III for details of tests and vectors of control variables.Standard errors are clustered by town and displayed in parentheses.

Table A.XX: Quadratic Specifications in Subsamples: Revenue Dependent Variables

	Dependent Variable (per Capita, % of Median):											
	Tax Receipts						Property Receipts (Placebo)					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Inverted-U-Shape												
Turning Point (%)	43	39	48	40	44	42	49	52	55	53	47	39
F-test (p-val)	0.00	0.01	0.02	0.15	0.11	0.01	0.82	0.59	0.79	0.50	0.43	0.84
U-test (p-val)	0.00	0.08	0.01	0.13	0.06	0.02	0.28	0.24	0.28	0.21	0.12	0.39
Δ in Dependent Variable:												
Increase ($fran \leq T$)	25	10	18	6	8	11	-	-	-	-	-	-
Decrease ($fran \geq T$)	47	46	28	28	20	34	-	-	-	-	-	-
Panel B: Regression Details												
Male Franchise	0.21***	0.24*	0.25***	0.14	0.14*	0.20**	-0.41	-0.98	-1.09	-1.11	-0.84	-0.32
	(0.063)	(0.133)	(0.096)	(0.097)	(0.077)	(0.083)	(0.672)	(0.972)	(1.604)	(1.014)	(0.658)	(0.893)
Male Franchise Sq	-0.02***	-0.03**	-0.03***	-0.02*	-0.02**	-0.02***	0.04	0.09	0.10	0.10	0.09	0.04
	(0.006)	(0.013)	(0.009)	(0.010)	(0.008)	(0.008)	(0.067)	(0.101)	(0.150)	(0.105)	(0.069)	(0.091)
No. Observations	4911	2856	2673	3818	3884	3853	4201	2408	2299	2751	3345	3303
No. Towns	150	84	83	118	128	118	150	84	83	98	127	118
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note: The table replicates the analysis in Table III for various subsamples of the data. Subsamples are defined as follows for each dependent variable. (1) includes outliers of the franchise excluded in main regressions. (2) Only towns with data available in all years. (3) Excludes towns with boundary changes, or different town and sanitary authority boundaries in 1871. (4) Excludes towns with franchise in 1866 above the estimated turning point for tax receipts per capita. (5) Exclude towns with population in top or bottom 10% of sample. (6) Exclude towns with 1873 tax base per capita in top or bottom 10% of sample.
See Table III for details of tests and vectors of control variables.Standard errors are clustered by town and displayed in parentheses.

Table A.XXI: Quadratic Specifications with Franchise Variables Not Lagged.

	Dependent Variable (per Capita, % of Median):							
	Public Goods Spend		Tax Receipts		Sanitation Spend (from 1872 only)		Property Receipts (Placebo)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Inverted-U-Shape								
Turning Point (%)	53	55	46	48	49	48	52	53
F-test (p-val)	0.00	0.00	0.07	0.09	0.00	0.01	0.76	0.76
U-test (p-val)	0.00	0.00	0.02	0.03	0.02	0.04	0.28	0.30
Δ in Dependent Variable:								
Increase ($fran \leq T$)	54	57	11	11	42	34	-	-
Decrease ($fran \geq T$)	38	33	20	15	52	47	-	-
Panel B: Regression Details								
Male Franchise	0.55***	0.55***	0.16**	0.14**	0.52**	0.44**	0.56	0.53
	(0.144)	(0.127)	(0.074)	(0.064)	(0.223)	(0.213)	(0.753)	(0.738)
Male Franchise Sq	-0.05***	-0.05***	-0.02**	-0.01**	-0.05***	-0.05**	-0.05	-0.05
	(0.013)	(0.012)	(0.008)	(0.007)	(0.019)	(0.018)	(0.075)	(0.076)
Male Franchise No Lag	-0.10	-0.15	0.07	0.05	0.02	-0.05	-1.43	-0.96
	(0.132)	(0.125)	(0.087)	(0.082)	(0.221)	(0.208)	(0.981)	(0.654)
Male Franchise Sq No Lag	0.01	0.01	-0.01	-0.01	-0.00	0.00	0.13	0.09
	(0.013)	(0.012)	(0.009)	(0.008)	(0.020)	(0.019)	(0.090)	(0.063)
No. Observations	4408	4296	4408	4296	3748	3712	3788	3748
No. Towns	150	149	150	149	150	149	150	149
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Town Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y	Y	Y
Occupation Controls	N	Y	N	Y	N	Y	N	Y
Tax Base per Capita	N	Y	N	Y	N	Y	N	Y

Note: Panel A shows the details of the inverted-U-shape estimated from the quadratic specifications using annual financial data for 1867–1900. "F-test" relates to a test of joint significance of the two franchise variables. U-test relates to Lind and Mehlum (2010)'s test of U-shaped relationships. Panel B shows details of the regressions. Franchise coefficients represent the effect of a 10% increase in the franchise (lagged 3 years). "Demographic controls" include town population (in six bins), urban crowding, decadal population growth, and female franchise. "Occupational controls" include the % of the population engaged in agriculture, the % in commerce, and the % of men over 20 that are heads of household. Standard errors are clustered by town and displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.