The franchise, taxes, and public goods: the political
economy of infrastructure investment in nineteenth
century England*

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Abstract

Many theories of democratization suggest that extending the right to vote will lead to increased government expenditure (e.g. Meltzer and Richard, 1981; Lizzeri and Persico, 2004; Acemoglu and Robinson, 2000). However, these models frequently assume that government can engage in transfer expenditure, which is often not true for local governments. This paper presents and tests a model in which government expenditure is limited to the provision of public goods. The model predicts that the poor and the rich desire lower public goods expenditure than the middle class: the rich because of the relatively high tax burden, and the poor because of a high marginal utility of consumption. Consequently extensions of the franchise to the poor can be associated with declines in government expenditure on public goods. This prediction is tested using a new dataset of local government financial accounts in England between 1867 and 1900, which captures government expenditure on key infrastructure projects that are not included in many studies of national democratic reform. The empirical analysis exploits plausibly exogenous variation in the extent of the franchise to identify the effects of extending voting rights to the poor. The results show strong support for the theoretical prediction: expenditure increased following relatively small extensions of the franchise, but fell following extensions of the franchise beyond around 50% of the adult male population.

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1 Introduction

Most theories of democratization 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). Poorer citizens demand greater levels of redistribution, hence government spending increases once they are granted the franchise. However the same argument may not apply to expenditure on public goods: if public goods are normal goods then the poor may prefer lower taxes and lower government expenditure than the middle class (Epple and Romano, 1996; Bursztyn, 2013).

This distinction is particularly important for local governments, whose powers are often limited to public good expenditure rather than redistributive spending (Shah and Shah, 2009). 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). If the poor must pay for public goods, through higher taxes or foregone transfers, devolution of power may lead to unanticipated opposition to government expenditure.

I propose a model of the relationship between the franchise and the size of government where government expenditure is restricted to investment in public goods. The model predicts that, if the marginal utility of consumption is high at low levels of income, the poor will oppose increased spending on public goods. The rich will also oppose increased spending since they bear a relatively high share of the tax burden. Demand for public goods is thus driven by the middle class: the relationship between the franchise and government expenditure is inverted-U-shaped. As a result, an extension of the franchise to the poor may lead to a reduction in public goods provision.

To test this prediction I construct a new dataset of local government expenditure and the
extent of the local franchise in England between 1867 and 1900. This approach offers three advantages over the cross-country analyses undertaken in many previous studies of franchise extension (e.g. Husted and Kenny, 1997; Lott and Kenny, 1999; Aidt et al., 2006; Aidt and Dallal, 2008; Abrams and Settle, 1999; Lindert, 2004). First, by using local government data I am able to capture the effects of extending the franchise on important infrastructure spending not measured in national government accounts. Second, because the municipalities all operated in a common institutional and cultural environment, I am able to isolate the effect of franchise extension from other confounding factors. Third, this period is of particular interest since, following the Industrial Revolution, town councils were faced with demands for new public goods—such as clean water and sewer systems—similar to those required in developing countries today (Günther and Fink, 2011). The political obstacles that councils faced in providing these key infrastructure investments are thus of continuing relevance.

To identify the effects of extending the franchise to the poor I use plausibly exogenous variation in the level of the franchise across time and across towns. While town councils were elected under a common electoral framework, there remained substantial variation in the extent of the franchise across towns. This variation resulted partly from nationally imposed registration requirements, which granted the vote only to heads of household who had met residence and tax-paying requirements. In addition, the poor law authorities also maintained some control over which individuals held the right to vote, particularly when considering the claims of female residents (partially enfranchised in 1869) or renters. Over time, however, national reforms to the electoral system led to convergence in the extent of the franchise across towns, providing a further source of exogenous variation that is exploited in the empirical analysis.

The main specifications test the effect of the franchise on two dependent variables: tax receipts per capita and public goods expenditure per capita. I estimate panel regressions with linear and quadratic terms in the franchise, and including time and year fixed effects.
The results show strong and consistent evidence of the proposed relationship: extensions of the franchise beyond 50% were associated with a decline in both the level of per capita public goods spending and per capita tax receipts. The results are robust to the inclusion of time-varying demographic controls, including potential sources of spurious correlation such as population growth and urban crowding. They are also robust to removing subsets of towns with very high or low levels of observable characteristics (e.g. very small or very large towns). Two placebo tests, using variables that we would not expect to be related to the franchise, show that the relationship is not a spurious artifact of the dataset. Finally, the results are robust to limiting the analysis to the period immediately before and immediately after major national reforms to the franchise.

One concern might be that opposition to government expenditure was driven by the fact that the poor did not understand the health benefits associated with sanitation investments, rather than a preference for consumption. To test this I examine how the relationship between the franchise and different types of public goods changed over time. The results show that the effect of the franchise on sanitary public goods diminished over time, suggesting that either growing wealth or knowledge of the benefits of sanitation infrastructure overcame taxpayer opposition. But the extent of the franchise continued to have the same effect on other public goods, such as tramways and electric lighting, that became widely available in the 1890s. This supports the hypothesis that opposition to public goods was based on income, rather than specific features of sanitation infrastructure.

2 Related literature

Local public goods such as sewer systems and clean water had a large impact on mortality in the nineteenth and early twentieth century, and they continue to do so in developing
countries.\footnote{For examples of historical studies see Szreter (2005); Cain and Rotella (2001); Cutler and Miller (2005); Troesken (2002); Ferrie and Troesken (2008); Kesztenbaum and Rosenthal (2013). For more contemporary evidence see Zwane and Kremer (2007); Ahuja et al. (2010); Fink et al. (2011); Zhang (2012) and many others.} Yet investment in these key public goods remains insufficient in many countries (Günther and Fink, 2011). In recent years, there has been increasing interest in devolving power over the provision of these public goods to local, democratically elected, institutions in order to ensure that the interests of all citizens are represented in decision-making (Olken, 2010). However, we do not know how effective democratic governments are in providing these goods (Ponce-Rodríguez et al., 2012).

Most theories of franchise extension imply that extending the right to vote to the poor will be associated with an increase in the size of government (e.g. Meltzer and Richard, 1981; Lizzeri and Persico, 2004; Acemoglu and Robinson, 2000, 2001, 2005).\footnote{See also Toscani (2012); Conley and Temimi (2001); Justman and Gradstein (1999); Jack and Lagunoff (2006); Bertocchi (2011); Borck (2007).} A cursory look at the British data (see Figure 1) supports this prediction. Between 1860 and 1900 the average municipal franchise approximately doubled from 9% to 18% of the entire population (including children)—coinciding with an even greater increase in public goods expenditure per capita, and a 30% decline in deaths from cholera and diarrhea.

However, as shown in Figure 1, this rapid increase was accompanied by great variation across different areas, with some towns spending less in 1895 than the median level of expenditure 20 years previously. Only two thirds of incorporated towns supplied water in 1900 and the extent of the investment in water supply also varied significantly across towns (Wohl, 1983; Millward and Sheard, 1995). This is particularly surprising given the high rates of social return to these public goods—clean water technologies had a social rate of return of 23 to 1 in major US cities in the early twentieth century (Cutler and Miller, 2005).

This paper examines how this variation can be explained by the extent of the franchise in different towns. The studies cited above generally rely on the assumption that local
Figure 1: Large decline in mortality coincided with rapid increase in local expenditure on public goods after 1870. However there remained large variation in the scale of variation in the size of local government expenditure.

Source: Mortality statistics from Dicennial Returns of Registrar General, and digitized by Woods (1997). For details of franchise and financial variables see Appendix A. Right hand panel excludes values above £2 per capita in 1895 for illustrative purposes.

governments have control over transfer payments. However in practice this is often not true of local governments, which can face nationally-imposed constraints on their expenditure powers. This is important, since whereas higher transfers are unambiguously beneficial to recipients, higher government expenditure on public goods can be subject to a trade-off

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3In Meltzer and Richard (1981), for instance, government expenditure is limited only to transfer payments. In Lizzeri and Persico (2004) government is able to choose from a full schedule of transfer payments and public goods expenditure.
between government public good provision and consumption. If all citizens must pay part of the cost of public goods—as in standard political economy models—the poor may prefer lower taxes than richer citizens (Epple and Romano, 1996).  

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 undertaken 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) 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). Specifically in the British context, this paper contradicts the argument of Aidt et al. (2010) that the poor drove the late nineteenth growth in government expenditure, by utilizing the new comprehensive data set comprising town finances in all municipal boroughs from 1867 onwards. Outside Britain, there is some evidence that poorer citizens sometimes oppose government expenditure both historically and today (Brown, 1988; Harding and Stasavage, 2014; Bursztyn, 2013). More generally, it does not appear that democratization is associated with lower mortality rates once sample selection is accounted for (Ross, 2006).

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4 Another possibility is that the value (real or perceived) of public goods varies across income groups, due to differing effects on productivity across industrial sectors (Llavador and Oxoby, 2005) or by increasing the return to capital and hence wage income (Aidt et al., 2010).

5 For evidence of a positive relationship between democratization and health outcomes, much of which is addressed by Ross, see Besley and Kudamatsu (2006); Kudamatsu (2012); Navia and Zweifel (2003); Zweifel and Navia (2000).
3 Model

This section presents a simple model showing that, if local governments impose linear taxes and cannot utilize transfer payments, the poor and the rich will desire lower tax rates than the middle class. In contrast to many previous models, I assume that towns controlled expenditure over public goods, but could not undertake redistributive transfer payments. I also impose the standard assumption that councils use linear tax rates. In Section 4 I show that these assumptions closely match the institutional constraints faced by town councils in nineteenth century England.

The model predicts that, 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 will be 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 or be forced to live in extremely cramped living quarters. The rich, on the other hand, oppose higher tax rates because they face a relatively high tax burden.

3.1 Framework

Consider an individual $i$ who receives utility from consumption $c_i$ and from expenditure on a local public good $g$. Utility from the public good is decreasing in the size of the population $N$. For instance, a fixed investment in clean water supply may only be able to serve a certain number of citizens. As such, utility is given by:

$$U_i = u(c_i) + v\left(\frac{g}{N}\right)$$

Individuals receive an income $y_i$, with aggregate income denoted by $Y$. The public good
is funded through a linear tax rate $\tau \in [0, 1]$, leading to a government budget constraint of $g = \tau Y$.

Assume $u$ and $v$ are strictly concave, continuous, twice differentiable and satisfy the Inada conditions with $u(0) = v(0) = 0$. In addition, I assume the follow 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.

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

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

then the conditions are satisfied for $s > 0$ and $0 < \gamma < 1$. The value $s$ here 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).

### 3.2 Results

**Individual’s optimal tax rates**

The assumptions over $u$ and $v$, combined with assumptions 1 and 2 are sufficient to give the
following proposition.\textsuperscript{6}

**Proposition 1.** Denote $\tau_i^*$ as the optimal tax rate for an individual with income $y_i$. Then there exists $\tilde{y}$ such that:

1. $\frac{\partial \tau_i^*}{\partial y_i} \geq 0$ for $y_i \leq \tilde{y}$
2. $\frac{\partial \tau_i^*}{\partial y_i} < 0$ for $y_i > \tilde{y}$

This proposition states that the optimal tax rate is inverted-U-shaped in income: the rich and poor desire a lower tax rate (and hence lower government spending per capita) compared with those with medium levels of income. The preferred tax rate is increasing in income until a point, $\tilde{y}$, after which the preferred tax rate 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.

**Extension of the franchise and public goods expenditure**

The discussion above has characterized how citizens’ preferences over taxation change with income. I now identify the translation of these preferences into the implemented tax rate. In particular, assume that the tax rate is set by a politician chosen through a standard two-candidate simple majority election, in which candidates’ promises are binding.

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, such that a citizen $i$ is only enfranchised once all citizens with $y_j > y_i$ are already enfranchised. Let $\tilde{\tau}$ denote the median level of $\tau_i^*$ for all individuals for whom $y_i \geq \tilde{y}$. That is the median tax rate desired by individuals who are on the decreasing part of the optimal tax function.

\textsuperscript{6}All proofs are contained in the appendix.
I make the following assumptions on the distribution of income in the town:

3. $|\{i | y_i \geq \bar{y}, \ i \notin E_0\}| \geq 2$; and

4. $|\{i | y_i < \bar{y}, \ \tau_i < \bar{\tau}\}| \geq 2$.

These conditions ensure the electorate will consist first of very rich citizens, then be extended to some middle income citizens, and finally to very poor citizens. The first condition states that there are some middle class individuals who are not initially enfranchised. The second states that there are some individuals sufficiently poor to want a lower tax rate than the rich.

**Proposition 2.** Let $N$ and $E_0$ be odd and assume $y_i \neq y_j$ for $i \neq j$. Then, given assumptions 3 and 4, the tax rate and amount of government spending per capita will be inverted-U-shaped in the level of the franchise.

This proposition states that extensions of the franchise will initially lead to higher tax rates but then, eventually, lower tax rates.

**Growth in town wealth**

The final proposition considers the effects of growing town wealth on public goods expenditure. This is likely an important factor in explaining the diffusion of public goods over time, regardless of the extent of the franchise. The effect of increases in average income can vary depending on how the additional income is distributed, since this will affect the identity of the median voter. As such, I consider increases in aggregate town income that are distributed equally across all citizens: i.e. the income of all individuals increases proportionally to average income. For instance, a 10% increase in average income would be associated with a 10% increase in every individual’s income.

**Proposition 3.** Increases in average municipal income are always associated with increases in expenditure per capita.
This proposition reflects the fact that an increase in average income leads to an increase in the tax revenue collected (i.e. the tax rate multiplied by aggregate income) at any given tax rate. As such expenditure in public goods may increase independently of the level of the franchise.

4 Data and identification strategy

I use data from nineteenth century local governments in England to test the model. In this section I first outline the data sources used for this analysis—further detail is provided in Appendix A. I then discuss the identification strategy underlying the empirical analysis in three parts. First, I explain how the spending and taxation powers held by town councils during this period matched the model assumptions. Second, I discuss the exogeneity of the franchise variable. Finally, I provide quantitative evidence that extensions of the franchise led to the enfranchisement of the poor.

4.1 Data

4.1.1 Sample

The focus of the empirical analysis will be on incorporated towns in England and Wales—the so called “municipal boroughs”—which possessed the broadest range of expenditure powers and were governed under a standardized council system from 1835 onwards. This group included nearly all the largest towns (except 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 revolution. The main specifications focus on a subset of these towns. In particular, the sample is limited to municipal boroughs that were both incorporated (i.e. had councils elected under the system described here) and had control of sanitary expenditure in 1867 (i.e. the start of the study period). 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.\footnote{The results are not dependent on the exclusion of these towns.} The remaining 150 towns include 92% of the 1881 population of the 214 municipal boroughs incorporated by 1867. Further, it includes all towns with population above 100,000 in 1881, and 35 of 41 towns with population above 50,000 in 1881.\footnote{These figures exclude West Ham and Croydon, which are suburbs of London and became London Boroughs at a later date.} The findings are unchanged using a broader sample—see the discussion of robustness tests in Section 5.3.

### 4.1.2 Financial data

The analysis uses a new annual panel dataset for the years 1867 to 1904. 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 use this dataset to construct three measures of government revenue and expenditure. The first is the level of tax revenue per capita. Second, I construct 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. However, given the importance of sanitary infrastructure to economic development, I also construct a measure of expenditure on sanitary public goods from 1872 onwards. This measure includes spending on “Water supply”, “Sewers and sewerage”, and “Highways, scavenging and watering”.

\footnote{These categories are those identified as having a sanitary aspect in Millward and Sheard (1995). Note that the measure of highways includes cleaning of the streets and “scavenging”—which refers to emptying of}
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. 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.\(^{10}\) An investment period is identified as starting when either a town begins spending 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.\(^{11}\)

privy middens. I combine the measures into a single variable, since some towns did not distinguish between them in the financial reports.

\(^{10}\)See the Appendix for more detail on the identification of these investment periods.

\(^{11}\)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 across the sample. However this approach has the difficulty that it may be biased against towns with generally high expenditure, and may lead to bias by excluding periods when important expenditure did occur.
4.1.3 Measuring 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) 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 dicennial 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 reflects 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 unchanged when including these observations.
4.2 Identification

4.2.1 Historical context fits model assumptions

The powers allocated to local authorities closely mirror the assumptions of the model. First, towns were governed by locally elected councils, established by the 1835 Municipal Corporations Act. Councils were chosen under a system of annual elections, with one third of councilors replaced each year. Further, it was the town councils that financed and provided local public goods. These public goods included, in particular, the key sanitary public goods—including water supply, street cleaning and sewer systems—required to combat the deterioration in sanitary environments following industrialization. By 1867 the vast majority of the municipal boroughs had the authority to undertake these large scale public works, with the remainder receiving such authority in 1872.

Second, municipal governments did not have authority to undertake transfer payments and did not control welfare (that is poor relief) expenditure (Lizzeri and Persico, 2004). Welfare expenditure was controlled by Boards of Poor Law Guardians, who were elected separately on a graduated franchise, with district boundaries which often differed substantially from those of the municipalities.

Third, towns’ taxation power was limited to the use of proportional property taxes, rather than business or income taxation. Because of this limitation, the tax burden was approximately proportional to household income, as assumed in the model. Further, the need for increased taxation was a key issue in local political debate. The new demands for expenditure led to intense taxpayer opposition, often leading to referenda and petitions in opposition to investment (Hennock, 1973, 1963; Wohl, 1983). This was often true amongst a “shopocracy” of small property owners (e.g. Yasumoto, 2011; Aidt et al., 2010) and poorer citizens, who opposed government expenditure since they cared more about their immediate income than an improved living environment (Hamlin, 1998).
4.2.2 Variation in the municipal franchise

Elections in municipal boroughs occurred under the “municipal franchise”, which was determined under different legislation to the Parliamentary franchise. As shown in Figure 2 the extent of this franchise, measured as a percentage of the adult population, varied considerably across towns and over time. In this subsection I explain this variation and argue that the variation is plausibly exogenous to expenditure on public goods, particularly since much of the change resulted from national legislation.

The franchise grew significantly between 1865 and 1895, as shown in Figure 2, although with continued variation in the size of the electorate across towns. This growth resulted partly from the enfranchisement of women, who gained the right to vote (if they were heads of household) in 1869. The male franchise also grew over time, with the median level increasing from around 34% of the adult male population in 1854 to approximately 60% in 1885.

In considering Figure 2 it is important to note that the right to vote was only given to heads of households—rather than to individuals. Since multiple men of voting age could share a residence (e.g. fathers and sons), the proportion of households enfranchised was higher than the proportion of voting-age men. This suggests 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 few women were heads of household (fewer than 7% of adult women in the 1881 census).

The framework under which the municipal franchise was determined by national legislation. From 1835 the electorate consisted of all male householders subject to residence and tax-paying requirements. However, while in theory this electorate was very broad, in practice the number of voters was frequently significantly below the “theoretical franchise”

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12 The construction of the franchise measure is discussed in Section 4 and in detail in Appendix A.
13 Author’s calculation based on analysis of individual-level census data.
14 Interested readers are referred to the Appendix for the discussion of the specific Acts that affected the municipal franchise: for the sake of brevity I refer to legislative changes only by the dates when they occurred.
Poor voters in particular were frequently excluded for two major reasons. First, the legislation imposed the requirement that voters must have been resident for at least three years and had to have paid local taxes for at least two and a half years. Second, citizens also lost the right to vote if they were on poor relief.

The requirement that the right to vote was determined by having paid taxes was a particular source of variation across towns, since it meant that local decisions over whom to tax determined the size of the electorate. In particular, towns varied in their approach to assessing occupiers of small dwellings. The low value of these houses often made it costly to tax them directly, and so in some areas tax collectors collected taxes from landlords, who paid on behalf of their tenants in return for a discount of around 20-25%. Prior to 1869, however, the law did not clearly specify whether tenants who did not pay their taxes directly

(Keith-Lucas, 1952). Poor voters in particular were frequently excluded for two major reasons. First, the legislation imposed the requirement that voters must have been resident for at least three years and had to have paid local taxes for at least two and a half years. Second, citizens also lost the right to vote if they were on poor relief.
had the right to vote. Whether these tenants were actually enfranchised thus depended on the actions of the local authorities: in many cases only the landlord’s name was entered on the ratebook—and hence the voting register—leading to significant disenfranchisement. Tenants were able to insist on paying taxes themselves but rarely did so since it required re-registering around 4 to 6 times each year.

The variation in the franchise resulting from differences in tax policy are plausibly exogenous to the level of public goods expenditure, since decisions over who was taxed and how were decided not by the municipal council, but by the authorities responsible for poor relief. These authorities were elected under a separate franchise under which the rich had multiple votes, and with different jurisdictional boundaries (Lizzeri and Persico, 2004).

An even stronger cause of exogeneity in the franchise is provided by two national reforms to the male franchise that occurred in 1869. The first enshrined the right of tenants to vote even when paying their taxes indirectly through their landlord. The second significantly reduced the length of residence and tax-paying requirements. The period of residency was reduced from three years to one—and the length of tax-paying required reduced from two and half years to six months. These reforms were exogenous to each individual town and provide a major source of variation in the franchise variable. Further, both of these changes would be expected to focus on the poor since these citizens were most likely to fail to pay taxes, move more frequently and to pay taxes through their landlords.

4.2.3 Regressions of franchise against observable characteristics

There are, however, important reasons that part of the variation in the franchise could be capturing the effects of observable town characteristics. Town population, for instance, is directly linked to the franchise measure through the definition of our franchise measure, but might also be related to economies of scale in the provision of sanitation. Similarly both population growth and urban crowding (defined as population/number of houses), may be
correlated with demand for public goods and also the extent of the franchise. This is because, first, population growth may be associated with more adults failing to meet the residence requirements for receiving the franchise. Second, more individuals per household would lead to individuals being disenfranchised since they were not heads of households.

Appendix Table 7 shows that in fact the level of the franchise was correlated with the level of the franchise in four different cross-sections (1866, 1873, 1885 and 1897). As such it is important to control for these characteristics in the main regressions. To check whether these controls are sufficient to remove correlation between the level of the franchise and observable town characteristics, I check whether the remaining variation in the franchise can be explained by other characteristics that we might expect to be correlated with expenditure on public goods.

Specifically, I first regress the male franchise on urban crowding, population growth, the size of town population (split into six bins), and a dummy variable indicating whether the town was incorporated in 1835. I then regress the residuals of that regression on four additional variables that we might expect to be correlated with expenditure on public goods: town population density (in 1871), the town tax base per capita, a dummy variable identifying whether more than 10% of the town population were engaged in farming in 1881, and a dummy variable indicating whether more than 5% of the town were engaged in the textiles industry in 1881. All individual coefficients, as well as joint F-tests, are statistically insignificant in these residual regressions. This provides reassurance that the observable characteristics we use in the regressions are sufficient to account for any correlation between the franchise and other town characteristics affecting town expenditure.

4.2.4 Did the wealthy get the right to vote first?

A key assumption of the model is that the extension of voting rights increased the representation of the poor, rather than other citizens. In this subsection I test the hypothesis that the
franchise was extended to the wealthy first using the proportion of Parliamentary electors in the electorate as a proxy for town wealth distribution. The right to vote in Parliamentary elections is an indicator that a citizen was relatively wealthy since (unlike the municipal franchise) 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.\(^\text{15}\) If extensions of the municipal franchise increased the representation of relatively poor citizens, then the rich would be more over-represented the smaller the franchise. We can then 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. Specifically, we can measure over-representation as follows:

\[
\text{Over representation} = \frac{\% \text{ Parliamentary electors in municipal electorate}}{\% \text{ Parliamentary electors in population}}
\]

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, we would expect the measure to equal one. If the wealthy are over-represented, on the other hand, then the number will be greater than one.

As shown in the left hand panel of Figure 3, in 1866 there was a clear negative relationship between the extent of over-representation and the extent of the municipal franchise in 1866. 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-

---

\(^{15}\)The empirical analysis in this subsection uses data from the 1866 Electoral returns (Parliamentary Paper 1866, no. 3626) relating to the approximately 150 municipal boroughs which had boundaries coextensive with Parliamentary constituencies in 1866.
represented, providing further evidence that the effects of the reforms was to extend the vote to poorer citizens.

**Figure 3:** Over-representation of wealthier citizens predicts extent of franchise before, but not after 1869 reforms.

![Graph showing over-representation of wealthier citizens before and after 1869 reforms.](image)

Source: Author’s calculations based on *Parliamentary Papers*, 1866, no. 3626, “Electoral Returns, 1865-1866”, and municipal franchise series (see Appendix A).

### 4.3 Poverty in Britain 1860-1900

A key part of our argument is that poorer citizens opposed expenditure due to income constraints. An important question is then what the poor were “giving up” in return for greater government expenditure. Answering this question is complicated, since it relies on understanding not only average incomes—a difficult task in itself—but also elements of the income distribution. However, it is possible to glean some insights into the type of constraints the poor were facing using contemporary data from specific places, at particular points in...
time. In particular, we can use these sources to provide some crude indication both the proportion of the urban population in poverty, and also how the poor spent increases in income. A detailed discussion of these questions is presented in Appendix D: in this subsection I provide a summary of the results presented there.

First, I use Rowntree’s well-known 1901 survey of York to identify the financial constraints faced by households at different levels of income—how much income was needed to escape poverty? This survey provides very estimates of the proportion of households living beneath the poverty line in 1899. I then back-cast these estimates to provide an indication the proportion of the population living in different levels of poverty in earlier years. The results indicate that a substantial portion of the urban population lived in poverty. Approximately 40% of urban households are estimated to have lived in “primary poverty”—indicating that individuals did not receive sufficient calories to achieve “minimum physical efficiency”—in 1860, falling to 16% in 1880 and 5% in 1914. However, a much larger proportion were estimated to live in under a more general qualitative measure of poverty—associated with living in squalor—with estimates indicating that up to three quarters of individuals faced these constraints in 1860, falling to 27% in 1914. These figures seem high, reflecting the fact that they represent perceptions of what constituted poverty forty years later, and so we must be cautious in interpreting them. However, they are useful in indicating that a high share of the population were likely facing important financial constraints during the period.

To understand in more detail what these constraints meant in practical terms, I estimate the income elasticities of the poor citizens using contemporary (1890) budget data for a sample of approximately 1,000 households (obtained from Haines (2006)). This analysis suggests that at very low levels of income, individuals used added income to increase their spending on rent and began to switch to higher quality foods—including meat, vegetables and fruit. As income increased further, individuals continued to increase the share of their spending on quality food, but also began to purchase more leisure goods (e.g. alcohol
and tobacco). This suggests that the trade-offs the poor faced in voting against greater expenditure on public goods were between better sanitation and expenditure that could lead to improved health through improvements in nutrition.

5 Empirical results

In this section I test 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. I first present simple semi-parametric plots of the data, followed by panel regressions that show the relationship is robust to the inclusion of time-varying town characteristics and town- and year-fixed effects. The subsequent subsection discusses the robustness of the results, using the reforms of 1869 as a source of exogenous variation and presenting two placebo tests. The final subsection shows that the magnitude of the reforms was large, but that the effect on sanitary expenditure weakened over time.

5.1 Semi-parametric analysis

Figure 4 plots the relationship between the male franchise (on the x-axis) and both tax revenue per capita (left hand panel) and public goods expenditure per capita (right hand panel), after controlling for year- and town- fixed effects. The y-variable in each figure is calculated by regressing the relevant dependent variable on year and town dummies, and then estimating the residuals. The figure presents a Nadaraya-Watson non-parametric regression of these residuals against the male franchise.

Both panels show clear evidence of the inverted-U-relationship. In both, there is evidence that the dependent variable increases until approximately a franchise of between 40% and 50%, and then declines beyond this point. This represents around the median level of the franchise prior to the reforms of 1869, and around the 25th percentile of the franchise.
Figure 4: Semi-parametric approach shows inverted-U-relationship with per capita tax receipts and expenditure, using Nadaraya-Watson nonparametric regression of residuals from regression against year and town dummies.

Source: Residuals estimated from linear regression of each dependent variable on year and town dummy variables for 1867-1900. Smoothed using Nadaraya-Watson nonparametric regression with Epanechnikov kernel, bandwidth chosen by rule-of-thumb estimator.

immediately following the reforms.

### 5.2 Panel regressions

The figures above show clear evidence of the inverted-U-relationship. In this subsection I use panel regressions to test whether this relationship remains after controlling for potential confounding factors.
I use a quadratic specification:

\[ g_{i,t} = \alpha + \beta_1 \text{franchise}_{i,t} + \beta_2 \text{franchise}^2_{i,t} + \gamma X_{i,t} + \gamma_0 Z_i + \delta \text{year} + \epsilon_{i,t} \]

where \( i \) indexes towns, \( t \) indexes year and \( \epsilon \) is an error term. The vector \( X \) includes town-specific time-varying controls including urban crowding (measured as number of houses/population, population growth, the extent of the female franchise, and population. To allow for potential economies of scale in the provision of these public goods, population is binned into six categories: less than 10,000 citizens, 10,000-25,000, 25,000-50,000, 50,000-100,000, 100,000-250,000 and greater than 250,000 citizens.\(^{16}\) Importantly, the panel structure also allows us to control for characteristics of towns—e.g. location—that do not vary over time, as well as time trends. All our specifications include town level (\( Z \)) and year fixed effects (\( \text{year} \)) that account for any time-invariant aspects of towns that may affect the level of expenditure.

The panel structure of the dataset means that the data is likely to suffer from serial correlation. While this will not bias the estimated regression coefficients, it may bias the size of the standard errors downwards. To adjust for this I cluster standard errors at the town-level in all regressions, allowing for any form of error correlation structure within towns. As an additional test of robustness to serial correlation, I run an additional specification including one and two lags dependent variables. The results, which are presented in the Appendix, are consistent with the main findings.

The existence of an inverted-U-shape relationship implies \( \beta_1 > 0 \) and \( \beta_2 < 0 \). As well as the individual statistical significance of these coefficients, I also check that the estimated turning point is within the interior of the franchise range, and that the two franchise terms are jointly significant with an F-test of joint significance. In addition, I use the test for U-shaped relationships developed in Lind and Mehlum (2010). This test adjusts for the

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\(^{16}\)The exact location or number of the bins is not important. For instance, the main results hold with population binned by decile.
fact that an inverted-U-relationship implies that the relationship between the franchise and the dependent variable must be decreasing before the turning point and increasing after—a joint restriction that may lead to problems when the estimated turning point is near the extremum of the dataset.

The results are presented in Table 1. Specifications (1) and (2) use tax receipts per capita as the dependent variable, while specifications (3) and (4) use public goods expenditure per capita as the dependent variable. Specifications (1) and (3) include only the measure of the male franchise and franchise squared, while specifications (2) and (4) include the control variables discussed above. To aid interpretation, the franchise variable is measured in terms of a 10% increase, while the dependent variable is standardized. As such, the coefficient on the franchise variable represents the effect of a 10% change in the proportion of men enfranchised as a proportion of a standard deviation of the dependent variable.

The inverted-U-relationship is strongly supported in all specifications, with both the individual coefficients and joint tests strongly statistically significant. The addition of the control variables does, however, reduce the size of the franchise coefficients the regression of public goods expenditure per capita by around one-sixth. We discuss the magnitudes of these effects further below.

5.3 Additional tests for exogeneity of franchise and robustness

The previous subsection shows clear and consistent evidence of an inverted-U-relationship between the level of the franchise and the size of government. By controlling for key town characteristics, as well as time-invariant town features, we have been able to account for many potential confounding factors. However, some readers may still be concerned that our franchise measure is capturing the effects of other, unobserved, variables that are also correlated with the size of government, and that lead to the inverted-U-shaped relationship.

As discussed in Section 4, the analysis in Table 7 in Appendix E provides evidence
Table 1: Fixed effects regressions show inverted-U-hypothesis, with and without control variables.

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
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<tr>
<td>Male franchise</td>
<td>0.43***</td>
<td>0.40***</td>
</tr>
<tr>
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<td>(0.12)</td>
<td>(0.12)</td>
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<td>Male franchise sq</td>
<td>-0.05***</td>
<td>-0.05***</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>No. obs</td>
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<td>4850</td>
</tr>
<tr>
<td>No. towns</td>
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<td>150</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Town Fixed Effects</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Popn. controls</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Franchise turning point (%)</td>
<td>45</td>
<td>44</td>
</tr>
<tr>
<td>F-test (p-val)</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>U-test (p-val)</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Dependent variables are standardized. Franchise coefficients represent the effect of a 10% increase in the franchise. Population controls include town population (in six bins), urban crowding, decadal population growth, and female franchise. Standard errors are adjusted by clustering by district, and are displayed in parentheses.

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

that our control variables are sufficient to capture these effects—particularly when combined with the inclusion of town fixed effects. Further, the most likely relationship between these variables biases against our hypothesis. In particular, we might expect that high population growth and high urban crowding would be associated with both a low franchise (as explained above) and a high level of expenditure on public goods—contradicting our findings. This is because both variables are likely to reflect rapid urbanization and so, if anything, would be associated with a higher demand for sanitation infrastructure and other public goods.

I address any lingering concerns in three ways. First, I seek to control directly for additional potential confounding effects by controlling for town tax base per capita, and by allowing for differing polynomial time trends according to 1871 town characteristics. Second, I restrict the analysis to focus on the period close to the 1869 reforms to the franchise. As explained in Section 4, these reforms comprised the single largest change to the franchise.
across the period of study. Focusing the analysis on the years immediately before and after these reforms therefore provides confidence that we are directly capturing the effects of the changing franchise, rather than other variables.

Third, I undertake two placebo tests by re-estimating the quadratic specification using two dependent variables that we would not expect to be affected by the franchise: per capita revenue from rents and property sales, and per capita expenditure on “lunatics”. I then check that there is, in fact, no evidence of the inverted-U-relationship in this case. This confirms that the finding of the inverted-U-relationship is not a spurious relationship created, in some way, by the structure of the dataset.

Fourth, I carry out a further set of robustness checks, varying the specification used and removing differing groups of towns from the sample. This ensures that the results are not dependent on a particular empirical framework or towns with specific characteristics. The results show consistently strong evidence of the inverted-U-relationship.

5.3.1 Controls for tax base and complex time trends

As a further test that we are capturing a causal relationship, I include additional control variables to capture potential sources of spurious correlation with the franchise. First, I include as a control variable a measure of the size of the tax base per capita in each town. This measure represents the aggregate “rateable” value of property in the district—including both houses and other forms of property. Including this variable acts as a proxy for town wealth, and in particular checks that the inverted-U-relationship is not driven by a relationship between the size of the tax base and decisions over who to tax: for instance if wealthier towns were more able to avoiding taxing the poor in order to deny them the right to vote. Data regarding the level of the tax base per capita is available (almost) annually from 1872 onwards, and also for 1866 and 1870: values for missing years are interpolated linearly. I use a three year moving average to provide a smoother measure of the tax base available to
Second, I include interactions between the 1871 levels of the three major correlates with the franchise discussed above (population, urban crowding, and population growth) and a fourth-order polynomial in time. By doing so, we allow for differences in the time path of the dependent variables according to these observable characteristics. This accounts for factors that might affect public health expenditure and be correlated with the franchise indirectly through these characteristics: for instance if public health movements began in more highly crowded cities in the early 1870s. (See Gentzkow (2006) for a previous application of this approach.)

Table 2 presents the results of these regressions; specifications (1) and (5) include the controls for tax base per capita, while the remaining specifications include the interactions between the observable characteristics and the fourth-order polynomial in time. There is clear evidence of the inverted-U-relationship in all eight specifications, with both the linear and quadratic terms statistically significant in all cases. The joint tests of significance are also statistically significant in all but one case—the F-test when the population time interaction is included in the regression of public goods expenditure per capita. Further, the estimated turning points remain similar to those reported in the main regressions. As such these results provide further reassurance that we are capturing idiosyncratic variation in the franchise.

5.3.2 Reforms of 1869

As detailed in Section 4 the reforms of 1869 acted as a considerable shock to the franchise, leading to rapid growth in the franchise within a five-year period, and continued growth over a ten year period as towns slowly adjusted to the new regulations. The simplest way to use this exogenously-imposed variation is to test that the inverted-U-relationship holds

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17Further discussion of the construction of this variable are provided in the Appendix. Given these measurement difficulties, I have also experimented with binning the tax variable into several quantiles, but this did not substantially change the results.
Table 2: Inverted-U-shape relationship is robust to inclusion of controls for wealth and interactions between control variables and time-polynomial.

<table>
<thead>
<tr>
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<th></th>
<th></th>
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</thead>
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<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Male franchise</td>
<td>0.25**</td>
<td>0.25**</td>
<td>0.24*</td>
<td>0.26*</td>
</tr>
<tr>
<td></td>
<td>(0.12)</td>
<td>(0.11)</td>
<td>(0.13)</td>
<td>(0.13)</td>
</tr>
<tr>
<td>Male franchise sq</td>
<td>-0.03***</td>
<td>-0.03***</td>
<td>-0.03**</td>
<td>-0.03**</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>No. obs</td>
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<td>4850</td>
<td>4850</td>
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<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Year FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Town FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Popn. controls</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Tax base p.c.</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Popn-time interaction</td>
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<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Crowd-time interaction</td>
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<td>N</td>
<td>Y</td>
<td>N</td>
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<tr>
<td>Growth-time interaction</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
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<tr>
<td>Fran. turn point (%)</td>
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<td>41</td>
<td>39</td>
<td>41</td>
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<td>F-test (p-val)</td>
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<td>0.01</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>U-test (p-val)</td>
<td>0.07</td>
<td>0.04</td>
<td>0.07</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Dependent variables are standardized. Franchise coefficients represent the effect of a 10% increase in the franchise. Population controls include town population (in six bins), urban crowding, decadal population growth, and female franchise. Time interactions reflect the interaction between the value the relevant observable characteristic in 1871 (population, urban crowding and population growth respectively) and a fourth-order time polynomial. Note that the 1871 levels of these variables are captured by the town fixed effects. Tax base per capita measures a three year moving average in the level of the rateable value per capita in each district. The number of observations is reduced in these regressions due to missing data in earlier years. Standard errors are adjusted by clustering by district, and are displayed in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

over the years immediately preceding and following these reforms. Over this shorter period there are less likely to be major changes in other variables, providing reassurance that we are capturing the effects of changes in the franchise. In particular, I repeat the quadratic tests above, but limit the analysis to three periods. Specifically, I include the year immediately before the reforms (1868), one year following the initial shock to the franchise and using the 1873 franchise data (1876), and one year using the franchise data a decade after the reforms—i.e. once the level of the franchise had stabilized across different towns (1882). The results, displayed in Appendix E, again provide clear evidence of the inverted-U-relationship with all individual coefficients statistically significant at a 5% level.
5.3.3 Placebo tests

I undertake two placebo tests to ensure that the results are not a spurious artifact of the dataset. In particular, I re-estimate the quadratic specification using two dependent variables that we would not expect to be related to the franchise: per capita receipts from “rents and property sales”, and the per capita expenditure on the maintenance of “lunatics” and asylums. We would not expect rent receipts to be directly connected to the franchise, since they are likely based on exogenous holdings of land. Similarly, responsibilities for lunatic payments were defined by external legislation, and depended on the number of paupers in a town—which was determined by the (separately elected) Poor Law Unions.\(^{18}\)

Table 3 presents the results of these tests. As expected, none of the individual or joint tests are statistically significant and in specifications (1) and (2) the coefficients have the incorrect sign.

5.4 Additional robustness checks

I have also undertaken a number of additional robustness checks on the results. First, I have tested alternative polynomial specifications, including a linear specification and polynomial specifications including franchise terms up to order six. In no case are any of the higher order terms statistically significant at the 10% level. There is narrow statistical significance in the linear specification for the tax regression, but this is much weaker than in the quadratic specification, and the quadratic specification is preferred under both the Akaike and Bayesian Information Criteria. In addition, I have varied the groups of towns included in the specification, including i) focusing on a balanced panel of towns, ii) including towns that were incorporated after 1867 or received sanitary authority after 1872 and iii) including towns excluded as outliers due to very high or very low values of the franchise. Second, I vary

\(^{18}\)Unfortunately, these variables are only available from 1872 onwards. Other results, available from the author upon request, show that the results in Table 1 also hold for this smaller period.
Table 3: Placebo tests show no relationship with the franchise.

<table>
<thead>
<tr>
<th></th>
<th>Receipts from rents p.c.</th>
<th>Expenditure p.c. on lunatics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Male franchise</td>
<td>-0.11</td>
<td>-0.18</td>
</tr>
<tr>
<td></td>
<td>(0.14)</td>
<td>(0.19)</td>
</tr>
<tr>
<td>Male franchise sq</td>
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<td>0.02</td>
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<td></td>
<td>(0.01)</td>
<td>(0.02)</td>
</tr>
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<td>No. obs</td>
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<td>4215</td>
</tr>
<tr>
<td>No. groups</td>
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<td>150</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Town Fixed Effects</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Popn. controls</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Franchise turning point (%)</td>
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<td>51</td>
</tr>
<tr>
<td>F-test (p-val)</td>
<td>0.74</td>
<td>0.67</td>
</tr>
</tbody>
</table>

Dependent variables are standardized. Franchise coefficients represent the effect of a 10% increase in the franchise. Population controls include town population (in six bins), urban crowding, decadal population growth, and female franchise. Standard errors are adjusted by clustering by district, and are displayed in parentheses. Change in franchise represents the effect of a 10% increase. Standard errors are adjusted by clustering by district, and are displayed in parentheses.

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

the definition of the franchise variable—including using different lag lengths, and alternative measures of population. As an additional check that our results are not capturing other characteristics of towns, I also tested the robustness of the results when removing towns with “extreme” 1871 characteristics, defined as being in the top bottom 10% or top 90% of the distribution of three variables: population, urban crowding and population growth. In addition, I tested the robustness to limiting the sample to towns incorporated in 1835. The results are supported in all regressions, with strong statistical significance in the expenditure regressions in particular.

5.5 Magnitude of the effects

The previous results have shown consistent evidence of the inverted-U-relationship until 1900—both for public goods expenditure per capita and for tax receipts per capita. In this section I show that these effects were large.
Figure 5 plots the estimated effect of extending the franchise using the results from Table 1 above. To provide a sense of scale, the effect is measured as a percentage of the median of the dependent variable across all towns between 1867 and 1900. An extension of the franchise from 30% to 40%, for example, is estimated to have led to an increase in taxation per capita of around 5% of the median level of taxation across the period. The changes in the franchise had an even bigger impact on public goods expenditure. An increase of the franchise from the maximum (at 51%) to 70% led to an estimated decline of over 15% of median expenditure per capita.

**Figure 5:** Franchise extensions had sizable effect on the level of taxation and expenditure per capita, measured as a percentage of the median between 1867 and 1900.

Estimates based on results of specifications (2) and (4) in Table 1.

While these effects were sizable, they may have changed over time as new public goods became available. In particular, the model predicts that, as aggregate town income increases
expenditure on public goods will increase. Over time therefore, we would expect the overall level of expenditure to increase and, possibly, that the relationship with the franchise will weaken. To explore this, I analyze the changing relationship between the franchise with both all public goods (our main dependent variable) and the subset “sanitary public goods”—water supply, sewers, street cleaning and refuse collection. This also lets us assess the extent to which the inverted-U-shape hypothesis applies to public goods in general, or whether it was limited to specific public goods. This is particularly important, since it provides some indication of whether opposition to greater expenditure might have been driven by, for example, a lack of understanding of the health benefits associated with sanitary public goods.

Figure 6 explores this possibility via a rolling regression in which I extend the sample by one year at a time. That is, the first regression covers the period 1872-1886, the second 1872-1887, etc. I then plot the estimated coefficient for the quadratic term on the franchise for “all public goods” and, separately, over time (that is, the y-axis measures the $\beta_2$ term in main specification). This provides an indication of the changing size of the relationship between the franchise and expenditure across the period. For comparability, both dependent variables are standardized in terms of standard deviations of the all public goods variable.

The figure shows that at the beginning of the period, the effect size is similar across the two categories: the effect of the franchise was focused on the important sanitary public goods. Over time, however, the size of the effect of the franchise on expenditure sanitary public goods decreased over time, supporting the hypothesis that over time growing wealth overcame taxpayer opposition to greater expenditure on these public goods. However, the relationship between the franchise and all public goods expenditure grows over time, reflecting the greater levels of expenditure that occurred towards the end of the period as new public goods, such as tramways and electric lighting, became available over time. Again, expenditure on these public goods was highest in towns with intermediate levels of the franchise.
6 Discussion

These results show that the relationship between the franchise and public goods expenditure was inverted-U-shaped: expenditure was highest at intermediate levels of the franchise. This finding is robust to the inclusion of a number of control variables, town-level fixed effects, and exclusions of specific groups of towns. The relationship is supported when focusing on the 1869 national reforms as an exogenous shock to the franchise. Further, placebo tests
show that the relationship does not apply to variables not under the control of the town council, indicating the relationship is not an artifact of the dataset.

I have proposed a simple model that explains this relationship through differences in attitudes towards public goods at different levels of wealth. Essentially the poor cannot “afford” public goods (they have a higher marginal utility from consumption), whereas the rich must pay a higher price (since their absolute tax burden is higher). This fits with historical evidence that shows that middle class reformers often struggled to win the support of the poor in pushing for sanitary investment.

Despite the opposition to public expenditure, it is clear that investment in sanitation grew over time. This could be a result of growing demand for sanitation as population grew, placing greater and greater pressure on existing systems. Alternatively, it could be a reflection of diffusion of knowledge, as the benefits of sanitation became more widely known over time. This is the subject of ongoing research. Third, greater investment could be a result of growing wealth, leading to higher marginal rates of taxation and hence investment across the board. This explanation is supported by the fact that the inverted-U-relationship applied not only to sanitation infrastructure, but also public goods such as tramways and electric lighting. This suggests that opposition to sanitation investment was not driven purely by a lack of understanding of the health benefits, but reflected more general factors.

These results have important implications for ongoing debates regarding the benefits of decentralization of expenditure powers to local government bodies. We frequently assume that poorer citizens will be willing to vote for public goods expenditure, as a result of their redistributive aspects. However, this may only be true if they are able to pass the cost onto the rich. In the setting examined here, this was not possible due to a reliance on property taxation; today many local governments face similar constraints on their ability to raise taxation. In other settings, many of the tax costs associated with environmental change such as gas taxes or airplane charges are also regressive. Identifying these constraints is
critical to understanding why change does—or often does not—occur.

Finally, the evidence presented here suggests a return to Lizzeri and Persico’s (2004) question: if it would lead to a decrease in public goods expenditure, why would the elites extend the franchise? One possibility is that extensions occurred in a period when the wealthy could still control how the poor voted either by manipulating the registration list or through directing them how to vote. After the reforms of 1869 and the secret ballot of 1872, however, that became much more difficult. Alternatively, it may be that the change in the municipal franchise are a reflection of national changes following the Second Reform Act of 1867. The growth of party politics during this period created new requirements for party agents to find and register supporters, and this may have spilled down to the level of municipal elections. Both of these are questions for future research.
References


House of Commons Parliamentary Papers (1842). Report from the Poor Law Commissioners on an inquiry into the sanitary condition of the labouring population of Great Britain.


A 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\textsuperscript{19}. A full list of the reports used is available upon request. Other sources are discussed below.

A.1 Financial data

Information is collected from the annual financial accounts reported to Parliament and collated in the *The Local Taxation Returns* contained in the Parliamentary Papers collection\textsuperscript{20}. 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 1900\textsuperscript{21}. Financial values are then translated into current prices using the Rousseaux Price Index (Mitchell, 1971, pp. 723-4) following Millward and Sheard (1995).

A.1.1 Defining ongoing public goods expenditure

Prior to 1885 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

\textsuperscript{19}See http://parlipapers.chadwyck.co.uk/
\textsuperscript{20}A full list of the Parliamentary Papers used is available from the author upon request
\textsuperscript{21}Comprehensive data is not available prior to 1867.
categories are defined separately in the financial reports. The “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” and “asylums” and “other expenditure out of loans”. 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) in the relevant category; and
2. either:
   - the town started expenditure on the relevant good in that period; or
   - there is a 100% year-on-year growth in expenditure on the good; or
   - the two previous years of data are missing, and the expenditure exceeds the median future per capita spending for the town; and
3. expenditure per capita exceeds the future median expenditure per capita in the town (excluding investment periods identified as above); or
4. expenditure per capita exceeds twice the future median expenditure per capita in the town (excluding investment periods identified as above).

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

1. the expenditure is greater than the previous period; or
2. the level of expenditure is twice the median future per capita spending for the town;

or

3. the expenditure exceeds the median future per capita spending for the town; and:
   
   • the level of expenditure exceeds the median percentile of expenditure per capita 
     (across all towns) in the relevant category; or
   
   • the expenditure is twice the town’s average expenditure over the period.

Between 1867 and 1871, public goods expenditure is not disaggregated in the financial reports, and so we 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.22

A.1.2 Definition of dependent variables used in regressions

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


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.

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22For a small number of towns the first period that disaggregated data was available is later than than 1872: in this case investment periods are defined relative to the first period data is available.
A.1.3 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. Before 1872 information regarding the annual value of the tax base was not reported alongside the financial accounts. However, there is some data available regarding the size of the tax base in 1867 and 1870—however, this relates only to the sanitary districts and not the municipal boroughs. We use this information to construct an annual time series by i) using the maximum reported tax base by a town in each year and ii) linearly interpolating values for missing years.

The need to interpolate missing values leads to one potential source of measurement error in these estimates. A further concern is that before 1872 we may underestimate the tax base, because we do not have information on the tax base reported as a municipal borough. While towns generally reported similar values under both categories, there were sometimes significant differences, reflecting factors such as local exemptions and discounting for tax purposes. Further, this is particularly concerning since this effect could differ across towns, and is focused on the period before the 1869 reforms—an important period for the analysis. Given these concerns, we measure the tax base per capita as a rolling three year average (for non-interpolated years) to smooth the effect of potential year to year changes. We have also checked that the results are robust to binning the tax base per capita variable.

A.2 Electoral data

Information as to the number of electors was collected from returns to Parliament supplemented by information for 1879 reported in Vine (1879), based on the author’s survey of municipal councils. 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. Informa-
tion 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.

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.

A.2.1 Differing measures of the franchise

As discussed in Section 4, 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.\textsuperscript{23} Each town is then matched to the relevant subdistricts 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.\textsuperscript{24}

The left hand panel of Figure 7 compares the estimated percentage of the male population over 20 using the two measures in large (over 50,000 population) towns—which correspond most closely to Registration Districts and hence are more comparable over time. The right hand panel compares the estimated franchise in 1881 using the two measures. 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.

A.3 Census data

Characteristics of urban areas, including population and number of houses, were gathered from a series of census reports between 1861 and 1911. Between censuses the population is interpolated at a constant annual growth rate. In several cases, however, towns underwent

\textsuperscript{23}More precisely, these are the Registration Sub-districts used by the Registrar General.

\textsuperscript{24}Smaller boroughs were often only a small part of a Registration District. As such this measure combines urban and rural areas.
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.

B Key legislation affecting the municipal franchise

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 rateable 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.\footnote{Vestries were the governing body of parishes which, after 1834, did not hold responsibility for deciding the level of taxation or spending. There were generally several parishes within each town (although boundaries did not coincide).}

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 reduced from two and half years to six months. The Act also enfranchised female householders aged 30 or older.

C 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. In addition, the assumption that both $u(\cdot)$ and $v(\cdot)$ functions satisfy the Inada conditions ensures an interior solution as long as $u(y_i) > 0$ (i.e. utility is positive when all income is spent on consumption).

Taking the first order conditions, the optimal $\tau^*$ is implicitly defined by the equation:

$$y_i u'(c^*_i) = \bar{y} v'(\tau^*_i \bar{y})$$

(1)

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.

Now, note that the left hand side of (1) is the marginal cost of raising taxation. Then the derivative of the marginal cost with respect to $y_i$ at $\tau_i$ is given by:

$$u'(c^*_i) + y_i(1 - \tau^*_i)u''(c^*_i)$$

(2)

When this expression is negative, the marginal cost of taxation is decreasing as $y_i$ increases: thus the optimal tax rate is increasing in $y_i$. In contrast, if the expression is positive, then the optimal tax rate will be decreasing in $y_i$. For simplicity I denote $r_R(c^*_i, u)$ as $r_R$. 55
The optimal tax rate is increasing in income if:

\[ u'(c_i^*) + y_i(1 - \tau_i^*)u''(c_i^*) \leq 0 \]

\[ -\frac{u'(c_i^*)}{y_i u''(c_i^*)} \leq (1 - \tau_i^*) \]

\[ 1 + \frac{u'(c_i^*)}{y_i u''(c_i^*)} \geq \tau_i^* \]

\[ 1 - \frac{1}{\frac{y_i}{c_i} R} \geq \tau_i^* \]

\[ 1 - \frac{(1 - \tau_i^*) y_i}{r_R} \geq \tau_i^* \]

\[ 1 - \frac{(1 - \tau_i^*)}{r_R} \geq \tau_i^* \]

\[ r_R - 1 \geq (r_R - 1)\tau_i^* \]

If \( r_R - 1 > 0 \), this gives \( 1 \geq \tau_i^* \). If, on the other hand, \( r_R - 1 < 0 \) this gives \( 1 \leq \tau_i^* \). Implicitly define \( \tilde{y} \) by \( r_R(y_i(1 - \tau_i^*)) = 1 \). Then by assumption 2 \( \exists y_i < \tilde{y} \). We know that \( \tau_i^* < 1 \) since \( u(\cdot), v(\cdot) \) satisfy the Inada conditions, thus the inequality holds strictly. Further, since \( r_R \) is monotonically decreasing, this holds for all \( y_i < \tilde{y} \). Similarly, assumption 2 ensures \( \exists y_i > \tilde{y} \). In this case the inequality can never hold: thus optimal tax rates are declining after this point. This completes the proof.

\[ \square \]

**Proof of Proposition 2**

*Proof.* First, note that preferences over \( \tau \) 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 \( \tau_i^* \) 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 $\tau^0$ as the median tax rate under $E_0$, and $\tau^m_i$ 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 $\{i|y_i \geq \bar{y}, i \neq E_0\}$, $\tau^*_i > \tau^*_i+1 \geq \tau^0$.

Thus as each of these citizens are enfranchised $\tau^m$ (weakly) increases. Further, this increase is strict at some point since $|\{i|y_i < \bar{y}, i \neq E_0\}| \geq 2$. By proposition 1, the optimal tax rate is increasing in $y_i$ for $y_i < \bar{y}$. Then all citizens $\{i|y_i < \bar{y}\}$, $\tau^*_i > \tau^*_i-1$. As a result, if the median tax rate decreases as the franchise is increased, it will always decrease for further extensions.

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

**Proof of Proposition 3**

**Proof.** Consider the situation where each voter’s income is a constant share, $\alpha_i$, of average income $\bar{y}$. Then the first order conditions become:

$$
-\alpha_i \bar{y}u'(1 - \tau^*_i)\alpha_i \bar{y} + \bar{y}v'(\tau^*_i \bar{y}) = 0
$$

(3)

First I show that spending per capita increases with $\bar{y}$. Note that we can divide through both sides by $\bar{y}$. Then suppose otherwise, which implies a reduction in $\tau^*_i$. Since $u''$, $v'' < 0$, then this implies that both terms increase, which is a contradiction. Since this is true $\forall i$, then the median level of spending will also increase.

To identify the relationship with $\tau^*_i$, we can use implicit differentiation of the first order conditions. This identifies that:

$$
\frac{\partial \tau^*_i}{\partial \bar{y}} \leq 0 \iff \tau_i \geq \frac{\alpha_i^2 u''((1 - \tau^*_i)\alpha_i \bar{y})}{\alpha_i^2 u''((1 - \tau^*_i)\alpha_i \bar{y}) + v''(\tau^*_i \bar{y})}
$$
Note that this expression is less than 1 and positive (since both the numerator and denominator are negative). Thus in general, this relationship will depend on the level of income of the individual $\alpha_i$, and the relative levels of $(u'', v'')$. Thus the outcome on the optimal tax rate will vary dependent for each individual, and the implemented tax rate will depend on the identity of the median voter (which may also change with a change in $\bar{y}$). However, as $v''(\cdot)$ approaches $-\infty$, the expression will tend towards 0, and hence always hold.
Poverty and expenditure amongst the urban populace 1860-1900

How poor were the poor during this period? Answering this question is complicated, since it relies on understanding not only average incomes—a challenging enough task—but also the income distribution. Further, the extent of living standards will depend also on the composition of households since many living costs, such as rent or fuel, are a fixed cost for the household. These are significant challenges, and I do not aim to address them fully in this article. However, we can use existing data to make some crude generalizations that provide some insight into the composition of the urban electorates that are the focus of this study. I undertake this task in two steps. First, I use Rowntree’s well-known 1901 survey of York to identify the financial constraints faced by households at different levels of income—i.e. how much income was needed to escape poverty? This survey provides very basic estimates of the poverty line, which we then back-cast to estimate the proportion of the population living in different levels of poverty in earlier years.

This analysis provides very crude estimates of the proportion of the population in poverty, but it does not provides any detail as to what the poor spent their income or, how this changed as they became richer. This is important for our analysis since it is these trade-offs that the poor faced when voting for or against taxes. To address this issue we analyze budget data collected by the United States Commissioner of Labor to estimate income elasticities of demand for different categories of expenditure.

D.1 The extent of poverty

To identify the level of income associated with poverty, we use Rowntree (1901)’s detailed 1901 survey of York households which estimates the income of all households in the city of
York in 1899.\textsuperscript{26} Based on qualitative reports of investigators, Rowntree estimates that 28% of the entire population of the city were in living in poverty—defined as displaying existence of “obvious want or squalor”—at this time (p117). Approximately 10-13% of the population were estimated as living at a level of poverty below “the minimum expenditure necessary for the maintenance of physical efficiency”, with the remainder explained as being poor due to “improvident expenditure” (particularly alcohol).\textsuperscript{27}

Rowntree’s analysis suggests that individuals earning below 18 shillings per week were living in “chronic want”, and those living at an income between 18 and 21 shillings per week were living hand to mouth, with any extraordinary expenditure requiring cutting back on food. These calculations are based on detailed calculations based on household size, adjusting for the fact that poverty depends on both total income and the composition of the household—including both household size and the number of children in the household.\textsuperscript{28}

Ideally we would use this detailed analysis of the composition of households when assessing the overall distribution of poverty over time. Unfortunately, Rowntree does not explain exactly how his level of “primary poverty” is distributed across household income groups. As such, I make the simple assumption that the 10% (28%) of population he classifies as being in primary (secondary) poverty relate to the lowest income households unadjusted for household size or composition.

Using this assumption, we can estimate the proportion of households likely to have been in poverty by using Rowntree’s income categories. In particular we use the following three categories:

\textsuperscript{26}This is one of the best known sources of information regarding the extent of poverty in the period. For further discussion of other sources see Gazeley and Newell (2007). There are some differences between the methods used to estimate poverty in these different sources, particularly over adjustments for household size. Given the crude estimates used here these differences are not likely to be very important.

\textsuperscript{27}Gazeley and Newell (2000) re-analyze Rowntree’s figures using a different adjustment for household size and argue that the correct figure is approximately 6%. However, this does not qualify the general conclusions relating to the number of households whose fluctuations in income led to changes in food; or the total perception of the population living in poverty.

\textsuperscript{28}See Gazeley and Newell (2000) for a detailed critique of Rowntree’s methodology.
• 20 shillings per week: corresponding approximately to the proportion in “primary poverty”;

• 25 shillings per week: Rowntree’s identifies that moderate-sized families in this income category often lived in poverty; and

• 28 shillings per week: corresponding to the estimated income threshold beneath which households were in “secondary” poverty.

Specifically, the proportion of households within each category is calculated by adjusting the percentage of working class households into a percentage of population using a fixed ratio, and assuming that households were uniformly distributed within income categories. The former assumption implies that household size was fixed across groups. This is clearly inaccurate, but is difficult to adjust for accurately due to data constraints. However, using simple adjustments to take this into account led to similar results.

Having identified these thresholds, I “back-cast” the proportion of households beneath these thresholds in 1860 and 1880, using figures from (MacKenzie, 1921). MacKenzie provides estimates of the proportion average family income at the 10th, 25th, 50th, 75th percentiles of the income distribution for the years 1860, 1880 and 1914; based on adjustments from figures of A.L.Bowley—a source often used by modern economic historians. I adjust these figures into 1899 constant values using the wage series of Crafts and Mills (1994), and adjust for the proportion of agricultural laborers in the labor force (based on the original article). The resulting proportions are shown in the table below.

The first point of interest is that the figures from Rowntree correspond relatively closely to the figures from 1914. This likely reflects the fact that first, there was relatively little

29 Referring to this fact, the average growth rates in the median income were close to the average growth rates in the Crafts and Mills (1994) wage series. This provides further reassurance that we are accurately capturing the growth in income.

30 I have also estimated figures for 1899 directly by interpolating between 1880 and 1914, but the results were very similar to the 1914 figures, so for simplicity I use the MacKenzie figures.
Table 4: Estimated proportion of urban households in different income groups
1860-1900

<table>
<thead>
<tr>
<th>% of households</th>
<th>1860</th>
<th>1880</th>
<th>1914</th>
<th>Rowntree (1901)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income &lt; 20s</td>
<td>39%</td>
<td>16%</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>Income &lt; 25s</td>
<td>62%</td>
<td>40%</td>
<td>18%</td>
<td>19%</td>
</tr>
<tr>
<td>Income &lt; 28s</td>
<td>76%</td>
<td>56%</td>
<td>27%</td>
<td>28%</td>
</tr>
</tbody>
</table>

Source: Income figures are refer to weekly income, and are in real terms. Estimates based on author’s calculations based on information from (Rowntree, 1901), MacKenzie (1921) and Crafts and Mills (1994). See text for details.

real wage growth between 1899 and 1914 (the Crafts and Mills series estimates growth of around 3% over this period) and second that York was a relatively prosperous town (Gazeley and Newell, 2007). This comparability provides some confidence that MacKenzie’s estimates are accurately capturing the income distribution of urban households.

The results suggest that a large proportion of households faced significant financial constraints during the period of study. In 1860—near the beginning of our period—almost 40% of urban households are estimated to been living “hand-to-mouth”. By 1880 the proportion of the population facing these constraints had fallen considerably; but between 40% and 56% of households nevertheless earned incomes that were associated with Rowntree’s secondary poverty.

D.2 Spending of the poor

What did the poor spend their money on? Rowntree provides evidence that for the very poorest category rent was a major expense; accounting for almost 30% of income on average. This proportion fell dramatically as income increased however, accounting for 19% for those with income between 18 and 20 shillings per week, 17% for those between 20 and 25 shillings per week, and 16% for those earning between 25 and 30 shillings per week.\(^{31}\) Further, he

\(^{31}\)The corresponding figures for higher income households were: 31s-40s: 14%; 41-50s: 12%; 51-60s:12% and over 60s: 9s.
indicates that even the poorest paid rates (largely through their landlord), with the combined total of rents and rates accounting for approximately 20% of income.

Rowntree’s evidence is less thorough, however, in estimating other types of expenditure—such as food—since he collected detailed budget data for just 18 households. Instead, we investigate the effect of changes in income on the composition of household expenditure using data from 1889 and 1890 surveys of the United States Commissioner of Labor (USCL).32 These surveys provide detailed information on the income and expenditure of 1,024 British families headed by industrial workers. These families are not a representative sample since they were chosen on the basis of industry (including woolen and cotton textiles, pig iron, bar iron and steel making, coke and glass manufacture, and coal mining).33 As a result, while the average incomes appear representative of their industries, the average earnings appear much higher than the population as a whole and are “not generally representative of the laboring poor” (Horrell and Oxley, 1999, p. 499). Nevertheless, we can use the budgets to estimate the changes in composition of income at least amongst this class of citizens. A further advantage of using the USCL data is that we can adjust for household size allowing us to assess the poorest citizens more accurately. In particular, we can identify the poverty line—the minimum level of income required to maintain physical efficiency—adjusted for the composition of the household, and then assess how close households are to that poverty line.

To identify the poverty line we use the estimated equivalence ratios calculated by Gazeley and Newell (2000). These estimates identify the minimum income needed for a childless couple, and then identify the multiple of that income needed to maintain a family with different numbers of children—up to families with 6 children. We exclude families with more than two adults or more than 6 children from the analysis, reducing the sample from 1024 to 921 (all families had at least two adults).

32The data were obtained from the IPCSR (Haines, 2006).
33For more discussion of the representativeness of the sample, see Horrell and Oxley (1999).
The results for this analysis indicate that only 8 families in the sample fall beneath this poverty line, reflecting the bias in sample discussed above. As such we cannot identify the budgets of the very poorest individuals. However, we can identify groups of workers relatively close to this poverty line. In particular, we use three definitions of poverty: those with an income of 1.25 times the poverty line, 1.5 times the poverty line, and 2 times the poverty line. The 1.5 times group relates most closely to Rowntree’s definition, if we consider a household income of around 18-20 shillings as defining primary poverty and an income of around 25-30 shillings as defining secondary poverty.

We will shortly use the data to estimate income elasticities of demand for different expenditure categories. However, as a preliminary step Table 1 displays the raw share of income spent on different expenditure categories for these three groups. Note that the first group is relatively small (including only 50 households), meaning that we should be careful about the conclusions we draw. In addition, the table also displays the proportion of households spending more than their income. A significant proportion of households were spending more than their income—almost 20% in the most generous poverty definition.

Food expenditure is split into “basic” and “non-basic” categories. Basic foods include butter, bread, condiments, flour, lard, potatoes, rice, tea and other foods. Non-basic foods include meat, poultry, pork, fish, fruit, vegetables, cheese, eggs, coffee, sugar, molasses and milk. We can see that the share of food in expenditure falls across the three categories; but the share of these non-basic foods increases slightly. A further point of interest is that even households in the poorest group spend money on both amusements (including reading), liquor and tobacco. At first glance one might think that this discretionary expenditure means that the household is not that poor. However, both contemporary and current evidence suggests that this kind of expenditure is common even amongst the very poorest. Rowntree (1901) argues that much of the secondary poverty he identifies is due to expenditure on alcohol—and that this is was itself an “outcome of the adverse conditions under which many
of the working classes live” (p144). A recent modern study shows that those earning less than $1 per day—the modern poverty line—the poor in many countries frequently spend a significant proportion of their budget on alcohol, tobacco and festivals even at the expense of more calories (Banerjee and Duflo, 2007).

Table 5: Household budgets for different income groups

<table>
<thead>
<tr>
<th>Share of income</th>
<th>Income ≤ 1.25x poverty line</th>
<th>Income ≤ 1.5x poverty line</th>
<th>Income ≤ 2x poverty line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic foods</td>
<td>30%</td>
<td>27%</td>
<td>25%</td>
</tr>
<tr>
<td>Food-basics</td>
<td>23%</td>
<td>24%</td>
<td>25%</td>
</tr>
<tr>
<td>Food-total</td>
<td>53%</td>
<td>51%</td>
<td>50%</td>
</tr>
<tr>
<td>Rent</td>
<td>15%</td>
<td>14%</td>
<td>13%</td>
</tr>
<tr>
<td>Clothing</td>
<td>14%</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>Lighting / fuel</td>
<td>9%</td>
<td>8%</td>
<td>7%</td>
</tr>
<tr>
<td>Amusements / vacations</td>
<td>1%</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Liquor and tobacco</td>
<td>4%</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Other</td>
<td>6%</td>
<td>6%</td>
<td>7%</td>
</tr>
<tr>
<td>Savings</td>
<td>-1%</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>Proportion borrowing</td>
<td>34%</td>
<td>26%</td>
<td>19%</td>
</tr>
<tr>
<td>N</td>
<td>50</td>
<td>163</td>
<td>447</td>
</tr>
</tbody>
</table>

Basic foods include butter, bread, condiments, flour, lard, potatoes, rice, tea and other foods. Non-basic foods include meat, poultry, pork, fish, fruit, vegetables, cheese, eggs, coffee, sugar, molasses and milk. Clothing is the aggregate of clothing for husband, wife and children. Amusements / vacations includes reading expenditure. Other includes contributions to labor, religious, charitable and other organizations, taxes (except property taxes), property insurance, life insurance, sickness insurance, furniture and other expenditure.

To understand the effect of increasing income more formally, we undertake a simple regression analysis. Using regressions allows us to use the variation in income within the broad categories discussed above, and also adjust for differences in household composition. Adjusting for the make-up of the household is important since different the food needs of a household will depend on the number (and age of children) in the household, as well as the occupation of household members. Those working in heavy industry, for instance, will have greater food requirements. Further, these variables will also be correlated with income per
household member since how many individuals are working and the industry of employment will both affect the total income of the household.

We estimate the income elasticity of demand for this group on a number of expenditure items, using the following specification:

\[ \ln\left(\frac{e_i}{N_i}\right) = \beta_0 + \beta_1 \ln\left(\frac{\text{income}_i}{N_i}\right) + \gamma X_i + \epsilon_i \]

where \(i\) indexes households and \(j\) indexes an expenditure category (e.g. food). The variable \(e_i\) thus identifies the spending of household \(i\) on category \(j\). The variable \(\text{income}\) represents the total household income, and \(N_i\) is the total size of household \(i\). Since both the independent and dependent variables are in logs, the coefficient \(\beta_1\) in this specification represents the income elasticity of demand for the good \(j\).

The vector \(X\) contains a number of characteristics of the composition of the household— the number of children split by age categories (0-4, 5-9, 10-15, and over 15), the number of working children, whether the wife works and eight dummy variables for industry of employment: pig iron, bar iron, steel, coal, coke, cottons, woolens, and glass.

In addition to calculating the income elasticities, we carry out a similar analysis to identify the effect of increased income on the probability of borrowing during the period. The probit specification we use is:

\[ \text{borrow}_i = \beta_0 + \beta_1 \ln\left(\frac{\text{income}_i}{N_i}\right) + \gamma X_i + \epsilon_i \]

Where \(\text{borrow}_i\) is a binary variable taking the value 1 if a household spent more than their income, and zero otherwise.

The results of this analysis are displayed in Table 2. Each cell represents the estimate of \(\beta_1\) from the regression specification above, along with the estimated standard error. The first eight rows refer to the income elasticity specifications, where the dependent variable is
log expenditure on each of the expenditure categories.\textsuperscript{34}

<table>
<thead>
<tr>
<th>Income elasticity</th>
<th>Income $\leq 1.25x$ poverty line</th>
<th>Income $\leq 1.5x$ poverty line</th>
<th>Income $\leq 2x$ poverty line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food-basics</td>
<td>-0.27 (0.54)</td>
<td>0.39* (0.20)</td>
<td>0.46*** (0.08)</td>
</tr>
<tr>
<td>Food-non-basics</td>
<td>1.77*** (0.42)</td>
<td>1.31*** (0.17)</td>
<td>1.03*** (0.07)</td>
</tr>
<tr>
<td>Food-total</td>
<td>0.87*** (0.27)</td>
<td>0.87*** (0.11)</td>
<td>0.76*** (0.05)</td>
</tr>
<tr>
<td>Rent</td>
<td>1.99*** (0.45)</td>
<td>1.04*** (0.21)</td>
<td>0.58*** (0.08)</td>
</tr>
<tr>
<td>Clothing</td>
<td>0.50 (0.62)</td>
<td>1.14*** (0.26)</td>
<td>0.87*** (0.11)</td>
</tr>
<tr>
<td>Lighting / fuel</td>
<td>0.53 (0.97)</td>
<td>0.40* (0.22)</td>
<td>0.08 (0.09)</td>
</tr>
<tr>
<td>Leisure</td>
<td>0.91 (2.32)</td>
<td>1.70** (0.64)</td>
<td>1.21*** (0.29)</td>
</tr>
<tr>
<td>Other</td>
<td>2.18 (1.33)</td>
<td>1.88*** (0.52)</td>
<td>1.75*** (0.22)</td>
</tr>
<tr>
<td>Change in probability of borrowing</td>
<td>1.73** (0.92)</td>
<td>-0.19 (0.30)</td>
<td>-0.25*** (0.11)</td>
</tr>
<tr>
<td>N</td>
<td>50</td>
<td>163</td>
<td>431</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses. Income elasticities based on regressions of log expenditure on log income per household member, with control variables of: number of children in age categories 0 to 4; 5 to 9; 10 to 15; and over 15, number of children working, whether wife working, and dummy variables for industries pig iron, bar iron, steel, coal, coke, cottons, woolens, and glass. “Change in probability of debt” represents the marginal effect of log income per household member on a binary variable identifying whether the household spent more than income, measured at the means of all control variables. Some regressions have fewer observations than the total in the group, due to zero expenditures on that category by some households.

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

The results indicate that in the poorest group additional expenditure led to large increases in the share of expenditure spent on higher quality food and on rent. Noticeably, the income elasticity of food as a whole is close to one—suggesting that these individuals may have been sufficiently poor that Engels’ Law did not apply.

\textsuperscript{34}There are fewer categories here than in the previous table. This is because we group some categories to overcome expenditures of zero on certain items.
Expanding the sample to include wealthier households (column 2) shows a similar pattern, with high income associated with a shift towards non-basic food items. However, rent now appears to increase proportionally with income, as does clothing. Both leisure and the other category are now classed as luxury goods—the latter category is driven in large part by furniture spending. Once households with income per family member of up to two times the poverty line, the income elasticity of both rent and non-basic food falls significantly. However, there is now evidence that an increase in income is associated with a decrease in the probability that individuals are relying on debt to fuel their expenditure.

In summary, this analysis suggests that at very low levels of income, individuals used added income to increase their spending on rent and to switch to higher quality foods, including meat, vegetables and fruit. As income increased further, individuals continued to increase the share of their spending on quality food, but were also able to purchase more leisure goods, such as liquor and tobacco. As income increased even further, the share of expenditure on both rent and good declined, with income instead being directed further towards these more discretionary goods, and also a reduction in borrowing.
E Additional regression results

Table 7 presents the results of regressions of the franchise against key dependent variables, in four cross-sections: pre-reform (1866), immediately post-reform (1873), 12 years after the reforms (1885) and the end of the study period (1897). The top panel shows the relationship between the franchise and the three major time-varying observable characteristics: population, urban crowding, population growth, as well as a dummy variable indicating that the town was incorporated in 1835. In the bottom panel, the residuals from these regressions are regressed on other observable characteristics that could plausibly be correlated with the level of government expenditure on public goods. These include the level of population density in 1871, the value of the tax base per capita, and dummy variables identifying whether the town had a significant proportion of farmers (more than 10% of the population) or textile workers (more than 5% of the population) in 1881.\footnote{Measures of the proportion of farmers or textile workers were constructed from the 100% sample of the 1881 census, discussed above.} For the 1885 and 1897 cross-sections, the measure of the tax base per capita reflects the three year moving average of the tax base per capita. For the 1866 and 1873 cross-sections the measure relates to the three year average in 1875 (that is, including the 1874, 1875 and 1876 levels) since this is the first year that a relatively stable value of the tax base, and hence a better proxy for wealth, is available. None of the independent variables in the second panel are statistically significant, suggesting that the remaining variation in the franchise is idiosyncratic.

Table 8 presents the results of the panel regressions including one and two lags in the dependent variable. The signs of the franchise coefficients have the correct signs in all four specifications, although the linear term is statistically insignificant in specification (2). Table 9 shows that the inverted-U-relationship holds when the sample is restricted to the three periods 1868, 1876, and 1882—the period near the 1869 reforms to the franchise. Again the inverted-U-relationship is strongly supported in these regressions.
Table 7: Variation in the franchise is idiosyncratic after controlling for urban crowding, population growth and incorporation year.

<table>
<thead>
<tr>
<th></th>
<th>1866</th>
<th>1873</th>
<th>1885</th>
<th>1897</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>DV=Franchise (% Adult male population)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population growth</td>
<td>-84.51</td>
<td>-4.62</td>
<td>23.34</td>
<td>-240.37***</td>
</tr>
<tr>
<td></td>
<td>(68.13)</td>
<td>(65.42)</td>
<td>(86.46)</td>
<td>(85.99)</td>
</tr>
<tr>
<td>Urban crowding</td>
<td>-6.17***</td>
<td>-6.26***</td>
<td>-5.14***</td>
<td>-4.37***</td>
</tr>
<tr>
<td></td>
<td>(0.93)</td>
<td>(0.79)</td>
<td>(0.93)</td>
<td>(1.21)</td>
</tr>
<tr>
<td>Popn 10k-25k</td>
<td>-3.68*</td>
<td>-2.53</td>
<td>-3.00*</td>
<td>-2.15</td>
</tr>
<tr>
<td></td>
<td>(2.07)</td>
<td>(1.72)</td>
<td>(1.80)</td>
<td>(1.52)</td>
</tr>
<tr>
<td>Popn 25k-50k</td>
<td>1.01</td>
<td>1.75</td>
<td>-2.94</td>
<td>-2.91</td>
</tr>
<tr>
<td></td>
<td>(2.69)</td>
<td>(1.93)</td>
<td>(1.81)</td>
<td>(1.82)</td>
</tr>
<tr>
<td>Popn 50k-100k</td>
<td>-9.40***</td>
<td>3.67</td>
<td>0.85</td>
<td>-3.07</td>
</tr>
<tr>
<td></td>
<td>(3.16)</td>
<td>(2.38)</td>
<td>(2.13)</td>
<td>(2.23)</td>
</tr>
<tr>
<td>Popn 100k-250k</td>
<td>2.29</td>
<td>4.26</td>
<td>0.19</td>
<td>-2.31</td>
</tr>
<tr>
<td></td>
<td>(4.79)</td>
<td>(2.88)</td>
<td>(2.53)</td>
<td>(2.02)</td>
</tr>
<tr>
<td>Popn &gt;250k</td>
<td>-19.14***</td>
<td>3.99</td>
<td>-3.98</td>
<td>-5.88**</td>
</tr>
<tr>
<td></td>
<td>(2.80)</td>
<td>(2.89)</td>
<td>(3.15)</td>
<td>(2.93)</td>
</tr>
<tr>
<td>Incorporated 1835</td>
<td>-3.28</td>
<td>-3.90**</td>
<td>-1.43</td>
<td>-1.53</td>
</tr>
<tr>
<td></td>
<td>(2.13)</td>
<td>(1.58)</td>
<td>(1.72)</td>
<td>(1.38)</td>
</tr>
<tr>
<td>No. obs</td>
<td>144</td>
<td>145</td>
<td>145</td>
<td>148</td>
</tr>
<tr>
<td>Adj. R-sq</td>
<td>0.37</td>
<td>0.38</td>
<td>0.25</td>
<td>0.36</td>
</tr>
<tr>
<td>F-stat</td>
<td>18.34</td>
<td>12.64</td>
<td>7.38</td>
<td>7.37</td>
</tr>
<tr>
<td>F-test (p-val)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

DV=Residuals from franchise regression

<table>
<thead>
<tr>
<th></th>
<th>1866</th>
<th>1873</th>
<th>1885</th>
<th>1897</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>&gt; 10% farmers</td>
<td>1.14</td>
<td>0.45</td>
<td>0.88</td>
<td>-0.26</td>
</tr>
<tr>
<td></td>
<td>(1.92)</td>
<td>(1.68)</td>
<td>(1.71)</td>
<td>(1.47)</td>
</tr>
<tr>
<td>&gt; 5% textiles</td>
<td>2.76</td>
<td>0.86</td>
<td>-0.84</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>(2.39)</td>
<td>(1.56)</td>
<td>(1.45)</td>
<td>(1.36)</td>
</tr>
<tr>
<td>1871 popn density</td>
<td>-0.01</td>
<td>0.01</td>
<td>0.00</td>
<td>-0.03</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.04)</td>
<td>(0.04)</td>
<td>(0.03)</td>
</tr>
<tr>
<td>Tax base per capita</td>
<td>0.82</td>
<td>-1.19</td>
<td>-1.01</td>
<td>-0.52</td>
</tr>
<tr>
<td></td>
<td>(1.01)</td>
<td>(0.92)</td>
<td>(0.61)</td>
<td>(0.54)</td>
</tr>
<tr>
<td>No. obs</td>
<td>139</td>
<td>139</td>
<td>139</td>
<td>141</td>
</tr>
<tr>
<td>Adj. R-sq</td>
<td>-0.01</td>
<td>-0.01</td>
<td>-0.00</td>
<td>-0.02</td>
</tr>
<tr>
<td>F-stat</td>
<td>0.59</td>
<td>0.46</td>
<td>1.08</td>
<td>0.60</td>
</tr>
<tr>
<td>F-test (p-val)</td>
<td>0.67</td>
<td>0.77</td>
<td>0.37</td>
<td>0.66</td>
</tr>
</tbody>
</table>

Dependent variable in bottom panel is the residuals from the regression in respective column in panel 1. Once population, population growth, urban crowding and whether incorporated in 1835 are controlled for, none of the remaining observable characteristics of towns predicts the level of the franchise.

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

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Table 8: Inverted-U-relationship supported in tests for serial correlation.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Male franchise</td>
<td>0.14***</td>
<td>0.11***</td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
<td>(0.04)</td>
</tr>
<tr>
<td>Male franchise sq</td>
<td>-0.02***</td>
<td>-0.01***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Lag 1 tax p.c.</td>
<td>0.72***</td>
<td>0.58***</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.02)</td>
</tr>
<tr>
<td>Lag 2 tax p.c.</td>
<td></td>
<td>0.20***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.02)</td>
</tr>
<tr>
<td>Lag 1 spend p.c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lag 2 spend p.c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. obs</td>
<td>4550</td>
<td>4533</td>
</tr>
<tr>
<td>No. groups</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Town Fixed Effects</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Popn. controls</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Franchise turning point (%)</td>
<td>45</td>
<td>44</td>
</tr>
<tr>
<td>F-test (p-val)</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>U-test (p-val)</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

See notes to Table 1. Note that the number of observations is reduced in comparison to Table 1 due to the inclusion of the lagged terms.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. 
Table 9: Inverted-U-relationship is also supported during period near reforms.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Male franchise</td>
<td>0.32**</td>
<td>0.34**</td>
</tr>
<tr>
<td></td>
<td>(0.15)</td>
<td>(0.15)</td>
</tr>
<tr>
<td>Male franchise sq</td>
<td>-0.03**</td>
<td>-0.03**</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.02)</td>
</tr>
<tr>
<td>No. obs</td>
<td>418</td>
<td>418</td>
</tr>
<tr>
<td>No. towns</td>
<td>145</td>
<td>145</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Town Fixed Effects</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Popn. controls</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Franchise turning point (%)</td>
<td>52</td>
<td>53</td>
</tr>
<tr>
<td>F-test (p-val)</td>
<td>0.08</td>
<td>0.07</td>
</tr>
<tr>
<td>U-test (p-val)</td>
<td>0.05</td>
<td>0.05</td>
</tr>
</tbody>
</table>

See notes to Table 1. Regression restricted to years 1868, 1876 and 1882.

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