THE SUCCESS OF THE EMBEDDED STATE IN ENGLAND*

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Abstract

Many states exhibit high degrees of capacity without having the fiscal resources necessary to fund a modern bureaucracy. In this paper, we argue that they achieve this by exploiting the social structure of the societies they govern. We develop the concept of the "Embedded state" and illustrate how it functions using a unique survey of British urban government from 1835. Since local authorities had few resources, only a third of their functionaries were paid. Instead, people were motivated by prestige and career concerns. We show that jobs where these incentives dominated attracted elites and people with higher ability. We also show that, as a consequence, unpaid officials were significantly more productive than paid ones. While the Embedded State was successful in providing public goods at low monetary costs, it also featured corruption and nepotism, and could not motivate unpaid bureaucrats to implement onerous tasks.

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1 Introduction

In many social sciences, successful governments are thought to be 'Weberian,' stemming from Max Weber's characterization of the emergence of the modern state (Weber, 1922). This state featured 'rational-legal' administration, central features being meritocratic recruitment and promotion of salaried and well-trained civil servants who implement policy impartially. A rich body of empirical work suggests that this model is more successful than its alternatives at providing public goods, ranging from cross-country comparisons such as Evans and Rauch (1999) (surveyed in Besley et al. (2022)), to natural experiments (Acemoglu et al., 2015; Dell et al., 2018), and randomized controlled trials implementing Weberian incentives (e.g. Khan et al. (2016, 2019)).

But Weberian governments are expensive. Partially as a consequence, most governments historically were *not* Weberian. Except in the Netherlands, tax revenues as a percentage of national income in European countries were less than 15% until the second half of the nineteenth century. As the Industrial Revolution began, tax revenues in England were around 10% of national income. In Prussia, Weber's paradigmatic powerful state, the number was 5% (Spoerer, 2010). These numbers are comparable to many failed states today, such as Haiti, Yemen, and the Central African Republic. Yet all these historical states were able to govern their countries, providing order, protecting property rights, building infrastructure, and supplying a variety of public services. How?

In this paper, we argue that the answer to this question is that there are many different ways other than monetary ones to incentivize and motivate people to work for the state. This is because the state is *embedded* in society, and people will exert effort if by doing so they acquire status, the activity is prestigious, or offers opportunities for subsequent career advancement. Alternatively, people may feel a duty to undertake certain activities or exert uncompensated effort because of pro-sociality or reciprocity. We claim that a state that harnesses such instruments, which we call an "Embedded State," can be a successful substitute for Weberian government, and may therefore be well-positioned to explain the large variation in public good provision between places that are all equally non-Weberian.

How do states with limited fiscal resources function? Addressing this question is challenging. It requires variation in state organization across comparable units, detailed records on administrative structure, and systematic measures of institutional performance — data that are seldom available.

This paper studies local governments in historical England. Our setting is well-suited to explore hypotheses on the Embedded State. First, governance in England was primarily carried out by local institutions, making the local state an essential component of public goods administration. Second, local units operated as heterogeneous and semi-autonomous "republics" (Collinson, 1994; Goldie, 2001), generating

considerable and idiosyncratic variation in state organization. Third, our novel data allow us to observe state organization at the level of individual officers, including paid status as a proxy for Weberianness, incentive structures and officer characteristics, and standardized performance measures across key government functions.

Our analysis proceeds in four steps. As a first contribution, we measure the size of the local bureaucracy — England's parishes, boroughs, and counties — and compare it to the central state, largely concentrated in London. We find that the central state employed about 5,000 individuals in 1700, whereas the local state comprised over 80,000 recognized officers. This disparity was comparably substantial in 1835.[1] In addition, a sharp contrast appears in the 'Weberianness' of the local and central state, measured by the prevalence of paid positions. In London, virtually all officers received a salary.[2] At the local level, by contrast, only about 5% of officials were salaried, while the vast majority engaged in public service alongside ordinary occupations or estate management.

In a second step, we describe the organization of one tier of local governance — municipal boroughs — in greater detail. We draw on a unique survey of all bureaucrats, paid and unpaid, in all 277 boroughs of 1835 (Municipal Corporations Commissioners, 1835). The report enumerates 5,095 individuals in 650 distinct offices, of whom 75% served without pay. In addition, it records the provision of a wide range of public goods, including policing and prisons, courts and judicial services, infrastructure construction and maintenance, clerical administration, and the general management of borough affairs.

We analyze the incentive and selection mechanisms that sustained unpaid service in local government. Drawing on historical evidence, we identify four distinct incentives that made officeholding attractive: prestige associated with the position, integration into a career hierarchy, task-specific flexibility, and autonomy. We operationalize each incentive in our data and show that they are systematically correlated with unpaid status. We then examine officer selection. Unpaid offices disproportionately attracted educated elites — gentry and clergy, but unpaid offices were also more prone to corruption and nepotism.

In a third step, we move beyond separate correlations to characterize the organizational system of English local government. We construct a composite index of the selection and incentive measures, and find that selection and incentives co-move: Boroughs that rely on incentives to compensate for being unpaid, are the ones with self-selected officers. Incentives and selection also co-occur at the task level. Some tasks, such as governance and judicial functions tend to be unpaid, prestigious, and attract the educated gentry and clergy, whereas others, such as prison management and policing, are more likely to be paid. These latter tasks are less flexible, and typically feature less autonomy.

[1] This exercise follows Goldie (2001).

[2] This reflects the "Tudor revolution in government" (Elton, 1953) and subsequent reforms (Brewer, 1989).

We take stock of these findings to characterize the Embedded State. Combining our empirical results with concepts from organizational economics, we find that embeddedness has benefits and costs. On the one hand, embedding state functions in social hierarchies and sources of prestige and career advancement generated two key advantages. First, the local state substituted monetary compensation with alternative, social, sources of compensation which enabled it to run a far larger state than financially feasible. Second, the bundle of incentives offered attracted a class of people that may not otherwise have been available. On the other hand, this organizational form entailed costs of control for borough governance. First, incentive misalignment — sustaining intrinsic motivation required granting flexibility and autonomy Second, adverse selection — the lack of oversight, and the selection of certain people, facilitated nepotism and rent-seeking. Third, implementation constraints — certain tasks and offices requiring standardized procedures, formal monitoring, or actions that conflicted with social norms were harder to implement. Therefore, policing, prison management, or other onerous tasks, could not be implemented through 'embedded' incentives and instead were sustained by salary.

In a fourth and last step, we assess the performance of paid and unpaid officers. Our unit of observation is an officer-task. We relate officer-level paid status to borough-task performance using our data on the task assignment of officers. Our empirical strategy is grouped around two potential concerns. First, while paid status varies at the officer level, performance varies at the borough-task level. We are thus in in a setting of team production with unobserved officer-level inputs (Bonhomme, 2025). We develop our empirical framework with this concern in mind and provide extensive robustness checks that unobserved inputs are not driving our results. We also address broader concerns about within-team and across-team spillovers. Second, paid status might be endogenous to task performance. Thus, our baseline analysis compares paid and unpaid officers in a triple-difference regression, holding fixed officer-task assignment and controlling for borough, task, and task scope fixed effects. We also include borough covariates interacted with task fixed effects.

We find that, on average, paid officers are associated with an eleven percentage point increase in performance in public good provision. This is an increase of 18 percent over the sample mean. We provide evidence that this result is robust to including additional controls, more restrictive fixed effects, and using a matched sample. Furthermore, we use our knowledge of the treatment assignment process — the determinants of paid and unpaid status — to isolate an idiosyncratic source of variation in the paid status of officers. A large aspect of the decision to pay an officer was driven by affordability. Borough income, as has been noted by historians, was in large part driven by idiosyncratic variation in income from assets, such as land, that were bequeathed to the borough in the past. We measure borough income and the component owing to asset income. Then, we calculate officer-level affordability: we calculate a 're-

quired market wage' for an officer by calculating the mean wage among all paid officers with the same task profile in other boroughs, and we calculate a 'salary priority' based on the fraction of those comparable officers that are paid. Going through officers in order of priority, we compare residual disposable borough income to the market wage, assigning a binary indicator of whether an officer is affordable. To isolate the exogenous variation in borough income, we repeat this affordability calculation 1,000 times, but reshuffling borough rental income at random. We control for this 'expected' affordability throughout our analyses (Borusyak and Hull, 2023). We then replace unpaid status with unaffordable status and find that being 'out of budget' is associated with a performance increase of 10 percent, very similar to the baseline estimates. We finally decompose our performance result into the effects of incentives and selection separately and find that incentives equate performance between unpaid and paid officers, and the selection of certain officers into unpaid positions explains the outperformance. We then show that unpaid officers are indeed higher ability, using a standard AKM decomposition technique (Abowd et al., 1999).

Taken together, these econometric results help explain how tax revenues could be so low in early Modern Europe, but governance could still be sufficient to permit economic growth and improve welfare. We also believe that they illustrate governance puzzles in the world today. For example, South Korea implemented a successful state-led development program (Lane, 2025) with tax revenues of only 10% of GDP, while Rwanda, which has only recently achieved a tax-to-GDP ratio of 15%, has a quality of governance on par with Greece or Portugal.

Our paper relates to the recent literature on state capacity referred to above. Much of this, exemplified by the work of Besley and Persson (2009), identifies state capacity with tax revenues, and indeed this is a standard way of measuring capacity in the literature (e.g. Dincecco (2017)). This approach is also common outside of economics (Tilly (1992), Herbst (2000)). Research in sociology has paid more attention to the organization of the state and the bureaucracy. Much of the focus has been on explaining the role of the state in East Asian economic growth, with the state being characterized as "hard" Jones and SaKong (1980) and generally highly effective at implementing policy (Johnson (1982), Wade (1990)). These characteristics are tied to the Weberian organization of the state, most explicitly by Evans (1995). The reverse side of this characterization is the work which relates the lack of capacity of many states to their lack of Weberian rational-legal features, in particular their "patrimonial nature" (Bratton and van de Walle, 1997). No scholar to our knowledge has emphasized before the extent to which many state functionaries are unpaid though this sometimes comes up in passing, see Ingelaere (2011) on the local state in Rwanda. It is worth observing that this entire literature has focused on the central government and paid little attention to local government, even though basic services such as public order, judicial services, and infrastructure were provided by the local government.

Our paper also relates to the historical literature on the organization of the English state. Since Elton wrote scholars have examined the emergence of modern state institutions (see Corrigan and Sayer (1985), Braddick (2000) and Hindle (2000) for overviews). While local issues arise, most of this work focuses on central state institutions. Scholars such as Kent (1995) and particularly Eastwood (1994) and Eastwood (1997) have proposed an alternative account of state formation which focuses far more on the local state.

Our conceptualization of the Embedded State and the mechanisms that we isolate are also related to a large literature in organizational economics, which we review in Section 5.3

The paper is organized as follows. In Section 2, we discuss the historical organization of the English state. Section 3 describes in detail the data we collect on municipal boroughs and their officeholders. Section 4 outlines four mechanisms for the selection of and incentives for municipal officers, respectively. Section 5 studies the relationship between incentives and selection, showing that they co-move and concentrate in certain public sector tasks, and uses these findings to characterize the 'Embedded State.' Section 6 evaluates the performance of this organizational model in providing public goods in the municipal boroughs. Section 7 concludes.

2 Background: The Local State in England and Wales

In this section, we briefly describe the territorial organization of the central and local state in England in the nineteenth century.

2.1 Comparing the Central and the Local State

The central state was mostly confined to London, and managed the military, foreign policy, and raised several direct taxes, most centrally dues in ports, and the excise tax on consumption. To raise taxes, it employed a rotating corps of excise officials in the countryside. The central state expanded over the course of the eighteenth and nineteenth century from about 5,000 people in 1700 to about 21,000 in 1835. This development has been described in detail by Brewer (1989). The comparatively small number of bureaucrats has led some to comment that the English government was laissez-faire, and did not touch the lives of ordinary people (Hanlon, 2024). It is true that the central state essentially did not interfere in individuals' lives at all (on this see also Collinson (1994), especially p. 17). Yet the state did reach everyone, it is just that the legal system, property rights protection, and public good provision, were all organized by the local government.

The local government in England consisted of three main layers, which we map in Figure 1. Below the

central government, there were 52 counties, and about 10,000 parishes. In between the counties and the parishes were cities and towns, which had various degrees of self-governance. Since we analyze a sample of towns in more detail, in the next subsection we discuss self-governance in more detail. We now first make an attempt to characterize the size of the local state.

It is hard to measure the number of individuals who were part of the local state. This is fundamentally because most individuals who held an official position in a parish, borough, or county did not get paid. They were not registered with any central government institution, nor were they supervised by the central state. The fact that most were unpaid means that they were 'off the books' from the perspective of London, and their appointment was recorded in vestry proceedings and borough council meeting notes, which were often not kept or didn't survive.

In Appendix Section B, we bring together the available data and reconstructions by historians to arrive at an estimate of the size of the local state, following a similar exercise by Goldie (2001). The result is in Table 1. The first two columns provide the number of public employees in levels, and the second two columns normalize by the adult male population. The last column contains an estimate of the fraction of employees who were paid. The first row provides, as a comparison, the size of the central state, which we discussed before. In 1700, the central state employed 4,920 individuals (0.33% of the adult male population), all of whom got paid. By 1835, this number increases to 21,305 (0.66% of the adult male population), which is close to the standard estimate in Brewer (1989).

In the next three rows we estimate the size of the local state. We start with the lowest level, the parish, which we map in panel A of Figure 1. In Table 2 we collect the most common positions at each level, for context. At the parish level, there were several offices that were yearly rotated between the inhabitants of the parish. For example, parishes had usually two overseers of the poor who were responsible for social security under the Elizabethan Poor Laws. In addition they had officers like the Churchwarden and the constable, who were responsible for law enforcement. For a brilliant treatment of parish governance, see Tate (1969). We estimate that the total number of individuals who had such recognized jobs at the parish level was equal to about three percent of the population. This means that in 1700 there were about 50,000 individuals who executed government tasks at the parish level, and by 1835 this number had grown to about 95 thousand. Interestingly, none of these officers got paid. Some were allowed to collect some fees, the constable for example was sometimes allowed to collect a fee for law enforcement (Kent, 1981). Yet the vast majority of officers had a day job and performed their government functions in addition to their regular source of income.

The next level of government is the borough or town. We map towns in panel B of Figure 1. It is not clear what defines a town relative to a large village. We discuss this issue in the next section.

What is clear, however, is that there were cities that were chartered as cities, and large cities, such as Birmingham, that were never chartered but that were obviously cities. We use a definition based on an urban indication available in the 1841 census to define what a city is; details are in the Appendix. At the city level, there were a myriad government positions because cities were at liberty to structure their own governance. Gomme (1879) provides a detailed overview and discussion of city officers. While there is a lot of diversity, most boroughs have a person in charge of the borough, often called a Mayor or Headborough. Typically, they employed someone to keep records, and sometimes officers to keep order. Since our main dataset consists of borough officers, we return to borough government in the next section. According to our calculations, borough government grew from about 7,660 individuals in 1700 to about 12 thousand individuals in 1835. Most borough officers were also unpaid: we estimate that about 71% did not get a salary.

The final level of local government is the county.[3] We map counties in panel C of Figure 1. At the county level, governance was less dense than at the lower levels of government. The key government task that was executed at the county level was law enforcement. Table 2 reports that the most common officers were the Sheriffs and the Justices of the Peace. The last common officer was the militia officer, responsible for military recruitment. Formally, the county was headed by a Lord Lieutenant of the county. Importantly, at the county level, too, most officers were unpaid. We estimate that there were 25,000 officers at the county level in 1700 and that this grew to about 41,000 by 1835. 90% of them did not get a wage.

In total, local government amounted to *at least* 148,000 individuals in 1835. Of these, nearly 95% did not receive a salary. This is the main reason why this fact is not widely discussed in the literature on the development of the English state (e.g., in Brewer (1989)). These officers were appointed at the local level and neither supervised nor paid by London. The number of unpaid officers is about 7 times the size of the paid bureaucracy.

Our estimate of the size of local government is an underestimate. This is so for two reasons. First, there was a diffuse array of officers that were appointed by the surviving manor courts, or courts leet, at the parish and town level. For example, these courts would appoint individuals to check the quality of agricultural output (*aleconners*, for example) or round up stray animals (the pinder). We omit these from our calculations because they didn't exist everywhere and their number is uncertain. Second, Goldie (2001)

[3]Other levels of government did historically, and contemporaneously, exist in the nineteenth century. These include the hundreds, which were a level in between counties and parishes. Other units includes sokes and wapentakes in different counties, hamlets and townships below parishes, and some units within cities, such as the city of London within London itself. Since these mostly did not tend systematically employ individuals, we do not include them here. Similarly, there were medieval manorial courts, called 'courts leet, which appointed individuals. These were especially prominent in parish government, where officers such as the pinder, the hayward, or the hogringer were appointed by manorial courts. Some officers in boroughs were also appointed by manorial courts, if a manorial court was still relevant for that borough. We do not code such manorial officers, because no systematic data exist. For the history of these units see Webb and Webb (1963), and for a case study of an individual parish that discusses manorial officers see Trotter (1919).

points out that most unpaid officers rotated yearly, whereas most salaried officers had longer tenure times. In Appendix Section B.2, we account for this turnover and find that over 27.6% of the male population may have held some local office in any given decade during the early nineteenth century.

Because the central state did not pay these officers, it also did not keep any records. While scattered records exist in local archives, there is no systematic data on local employment, with one exception, the Municipal Corporations Commissioners (1835)'s report. This report records a vast amount of detail on municipal boroughs, which were chartered cities. We use this source to construct our dataset. We map total employment and information on salaries for our sample boroughs to Table 1 for comparison, and we map our sample boroughs in panel B of Figure 1. Before we discuss this report, we briefly discuss the history of these municipal boroughs.

2.2 The Municipal Boroughs

Municipal boroughs were urban areas that were mostly constituted by a royal charter, but could also be established "by practice and custom" (Chandler, 2007, p. 12). Such charters created a governing body known as the corporation, which Maitland (1898) called a "legal fiction." The Webbs in their multi-tome history of local government identified the ability to independently appoint justices as being the key identifying feature of such a borough (Webb and Webb, 1908, pp. 261-6). What was the advantage of such a status? "For a town to be incorporated was a mark of status; it denoted the possession of special privileges, with respect to trade and government, which distinguished the town for its surrounding hinterland and its unincorporated neighbors. The rights ... generally included the right to hold courts ... Incorporation also gave the town an identity at law, meaning that it could sue or be sued in the courts" Sweet (2014). There was a lot of heterogeneity in the rights that charters created or that custom established. Sweet points out that "The rights conferred by a charter varied in detail from town to town" Sweet (2014), leading to an "anarchy of local autonomy" (Webb and Webb, 1963, p.5). The origins of these charters are complex, with some arguing that they simply formalized ancient Anglo-Saxon privileges (Chandler, 2007) and others claiming they emerged later as urban areas negotiated with the monarchy for privileges and autonomy in exchange for taxation (Reynolds, 1977).

There is consensus that the boroughs had few resources and thus needed to use non-financial instruments to motivate the members of the corporation to engage in administration. While parish government could raise rates on property and other things with some flexibility, "In urban areas raising funds was more problematical as the charters of incorporation of many towns did not allow for the imposition of rates" (Chandler, 2007, p. 22). Some boroughs did have endowments of land which could generate in-

comes, but there were often restrictions on this. Sweet notes about corporations that "their finances were generally extremely restricted. In many cases their governing charter actually stipulated a limit to the value of the property, which they might hold a limit that was not adjusted to keep pace with inflation" Sweet (2014). This was significant because outside of ports such as Bristol, Liverpool, or London, which had property rights over the harbor and could levy tolls "corporate wealth tended to be derived chiefly from land" Sweet (2014). The Webbs document different idiosyncratic sources of revenues in different boroughs (Webb and Webb, 1906, pp. 228, 482) but stress the general "paucity of resources" (Webb and Webb, 1906, p. 535). Eastwood summarizes a gamut of restrictions by stating that "towns enjoyed relatively weak fiscal powers" (Eastwood, 1997, p. 79).[4]

Bereft of resources, boroughs could not afford to pay people to undertake all of the functions necessary for the town to function. To induce effort "Office ... became a mark of status and prestige within the community and was, ideally, desirable in itself" Sweet (2014). The idea that holding office generated prestige is commonly articulated: "members of the elite gladly became servants of the state ...not simply for the direct material rewards, but also for the prestige and influence those offices conveyed" (Patterson, 1999, p. 3) (see also (Aylmer, 1959, p. 238). Pulling these themes together, Sweet observes that the corporation of Leeds "had prestige and authority, but a very restricted income, being poorly endowed with lands" Sweet (2014).

3 Data: State Organization in Municipal Boroughs

In this section, we discuss our data source, the Municipal Corporations Commissioners (1835) report. We discuss its structure, and then discuss how it records the officers that work in each borough and the characteristics of each office, such as whether it attracts a salary. Boroughs implement several public goods, and we observe the assignment of individual offices to the tasks of providing such public goods. Finally, we observe whether public goods were successfully provided or whether a borough failed to provide its desired public goods.

Importantly, the report provides clear leads for how officers were compensated when they weren't paid. This compensation comes in the form of alternative *incentives* and attracts a selected group of individuals. We end this section by discussing observables we can measure for each borough in our sample.

We find that boroughs varied considerably in their workforce, whether it is compensated, and their performance in providing public goods. This variation is the basis for the remainder of our paper, in

[4]There is absolute consensus amongst scholars on this topic, for example "A remarkable feature of these bodies was the narrow financial foundation on which most of them were reared" (Hennock, 1963, p.214).

which we first characterize the incentives that compensate for being unpaid, and then the selection of individuals into unpaid jobs before comparing the performance of unpaid to paid officers that are part of the *teams* of officers who implement different public goods.

3.1 Our Data: The Municipal Corporations Report

Our description of the English local state relies primarily on the 1835 *Report of the Commissioners Appointed to Inquire into the Municipal Corporations in England and Wales*. We discuss its origin before discussing its contents. The report, in a systematic manner, discusses each of 277 municipal boroughs in England. The fact that it systematically discusses each borough, the officers it employs, and its performance on public good provision allows us to use it as a basis for our analysis.

3.1.1 Origins and Administration

In 1833, Parliament authorized a royal commission to investigate the English municipal boroughs, whose methods of government were largely unknown. Twenty commissioners[5] were appointed. Most were lawyers or legal scholars of some form, such as Sir Fortunatus Dwarris, author of a renowned 1830 treatise on statute law, and Peregrine Bingham, a contributor to *The Westminster Review* and friend of Jeremy Bentham and John Stuart Mill. The country was divided into eleven districts; two commissioners were selected to compile reports on each of the first nine, and those who finished first were allocated to the final two stations, comprising London and its surrounding towns. The commissioners were asked to investigate all aspects of the municipal corporations—especially their constitutions, officers, finances, justice systems, and privileges—and given significant powers to do so. They could compel testimony under oath with full authority to summon witnesses and demand all of a town's records (e.g. charters, deeds, and accounts). The commissioners also visited boroughs to assess their infrastructure. The instrument that was used to compile the report is described in detail in Appendix Section C.1.

The commissioners were unable to find any official list of municipal corporations. They investigated 285 places, 246 of which they found to possess municipal functions. Five towns refused to offer up any information, while four participated in an incomplete way.[6] Across the main report and a 1837 follow-up, we have data for 277 boroughs.

[5]John Blackburne, Sir Francis Palgrave, George Long, Fortunatus Dwarris, Sampson Augustus Rumball, George Hutton Wilkinson, Thomas Jefferson Hogg, Peregrine Bingham, David Jardine, Richard Whitcombe, John Elliot Drinkwater, Edward John Gambier, Thomas Flower Ellis, James Booth, Henry Roscoe, Charles Austin, Edward Rushton, Alexander Edward Cockburn, John Buckle, and Daniel Maude.

[6]This is because the attempt by parliament to collect information was seen in some boroughs as an illegitimate exercise of authority - see the discussion in Chapter 5 of Sweet (2014).

3.1.2 Contents

What does the report tell us about the administration of the local state? The commissioners sent the mayor or town clerk of each borough a form letter describing sixteen topics of interest, listed in full in Appendix Section C.1. This standardized survey, in combination with borough records and witness reports, resulted in towns' reports having a relatively uniform structure. Here, we walk through a characteristic borough chapter, the borough of East Looe, to illustrate the information provided on the operations of the local state. Please refer to Figures 2-5.

After discussing the boundaries of the borough, and details on its governing charter, each borough description goes through a list of offices that are occupied in a borough. We from now on use the terminology officer to describe an individual who holds an office that exists in a borough, such as a mayor. We now discuss the information that is available about officers. Please refer to Figure 2 for an example.

Officer List Critically, the commissioners requested information on "[t]he several Officers of the Corporation, how, and by whom elected, or removed; the time for which they hold their respective offices; their respective Functions and Privileges, and their Salaries and incidental Emoluments." This resulted in a comprehensive list of officers for each borough. A typical town's chapter enumerates *all* offices occupied by officers in the corporation, along with a short paragraph describing a series of characteristics:

Means of Appointment. An officer's description begins the means of appointment. If the officer was *elected*, it is stated who comprised the electorate. If the officer was *appointed*, the principal is named.

Eligibility. The report often mentions which individuals (councilmen, burgesses, or residents, for instance) can be appointed to an office.

Functions. Next, the report describes the officer's functions, i.e. the *tasks* performed in the borough. Some officers performed only a single task; others were assigned to a range of roles across several domains.

Remuneration. The report lists the salaries of all paid officers. Fees or in-kind payments are mentioned, but not usually valued. It is explicitly mentioned whether an officer is paid.

The officer list is also clearly ordered by *prestige*. It always begins with the mayor and governing body. It then lists all municipal offices, starting with judges and clerks, before discussing the 'inferior officers', such as the crier or mace-bearer. Figure 4 shows part of the officer list for East Looe, highlighting the above categories when stated explicitly.

The *names* of officeholders are not systematically recorded, but the report does offer information on who was *eligible* to serve in the role.[7]

[7]We compile evidence on officers' identities and characteristics from two sources: first, from a 1790 gazetteer of notable in-

Public Goods The commissioners also tried to evaluate the *performance* of local institutions in providing several key categories of public goods. A discussion of the justice system follows the officer list, focusing on three subtopics:

Courts. The chapter enumerates all courts known to have operated in the town, discussing which have present functions and what they are. Figure 3 lists the courts present in East Looe.

Police. The chapter discusses borough police, specifically the number and remuneration of officers, and grades the force on its adequacy or efficiency.

Prison. Similarly, the chapter lists all prisons operated by the corporation, along with gaol officers and their salaries. Prisons are also graded, with special mentions made either for new or decrepit establishments.

The chapter also includes an evaluation of the borough's *infrastructure*, usually whether the town's streets are lit and paved. Figure 4 shows the report's evaluation of policing, prisons, and infrastructure in East Looe.

Finances When available, the report is accompanied by detailed borough accounts, showing line-by-line its sources of income and items of expenditure. East Looe's accounts can be seen in Figure 5.

Governance The chapter closes with a lengthy discussion of the functioning of the borough's corporate system. This discussion is summarized in an analytical index attached to the report, which assesses whether the borough was subject to any of eleven discrete types of malfeasance, such as corruption or political patronage. This part of the report is very important to us because it records, for different offices, whether they were directly involved in various acts of corruption or nepotism.

3.2 Officers and Tasks

We digitize all offices from the municipal report. We record their titles, paid status, and salary where applicable. We also map offices to their respective tasks. We distinguish seven core tasks, motivated by the historical evidence in Section 2. Appendix Section C.2 demonstrates our procedure in detail and provides summary statistics.

Governance. This task captures the overall management of the borough. Officers who are listed as "conducting the affairs of the borough" are listed as governing. Typical officers engaged in governing are the mayor and the aldermen.

habitants of English towns, and second, from the biographies of members of Parliament—for whom municipal office was often a stepping stone to national honors.

Judicial. This task encompasses the functions of the town's court system. Any officer who is listed as an active judge is included. These are often the mayor and (capital) burgesses, and sometimes dedicated justices.

Infrastructure. Any officer who is described as maintaining or installing roads, lighting, or other kinds of public property falls under infrastructure.

Financial. This task covers the management of the town's finances, for instance, collecting taxes, auditing accounts, or disbursing payments. Often there is a 'chamberlain' assigned to finances.

Clerical. Any officer who is described as keeping accounts or records is coded as 'clerical.' Most commonly such officers are explicitly clerks.

Prison. Officers involved in the management of the town gaol are coded under 'prison.' Mostly commonly, they are the gaoler or the matron or chaplain of the gaol.

Police. This task covers all officers involved in law enforcement, most commonly the constable.

Offices can execute several different tasks. While some offices, such as the gaoler, are tightly connected to some particular task, others are not. Mayors, for example, often engage in governing, judicial tasks, and yet other tasks, like financial management or infrastructure management.

We saw that officers are arranged by prestige in the report. The tasks that officers engage in were associated with other aspects of English political life that are potentially important for our paper. Experience in government, municipal or at the county level, often prepared one for a career in Parliament. More importantly, however, civic duty was part of the social expectations of different classes in society. The nobility rarely took up municipal positions, they were more often appointed as the Lord Lieutenant of the counties or in London. County and borough management was a task that, anecdotally, was taken up by the well-to-do 'gentry' middle class (see e.g. Eastwood (1994) on this). In addition, the local clergy often took up positions in boroughs, as can be seen from the one of the rare instances in the report in which individuals are mentioned, in Figure 2. We study prestige and career opportunities as alternative incentives in the next section, and we study the selection of individuals into borough government as well, after we discuss other borough observables.

3.3 Boroughs

Next, we introduce borough covariates. We observe a wide array of borough characteristics. Appendix Section C.3 details each source and provides summary statistics. [LH: Fill this in]

Distance Distance to river, distance to market town, distance to London, distance to coal field, distance to border

Economy Seaport (1680), market town (1680), lay subsidy tax (1334), lay subsidy tax (1332), lay subsidy tax (1327)

Geography Wheat suitability, mean slope, longitude, latitude, attainable wheat yield, attainable pasture yield, area,

Politics Manorial lord, charter year, number of nobility (1680), number of MPs (1680), number of knights (1680), number of gentry (1680), number of gentry (1370), number of bishops (1680), number of baronets (1680).

4 Officers: Incentives and Selection

In this section, we study how an unpaid local state organization in England was sustained. We first distill four aspects of the incentives and the selection of the officers, respectively, from our borough report. For each aspect, we then derive a measure at the officer level and assess the comovement with unpaid status. In Appendix Section C.4, we discuss these measures in detail and show descriptive statistics.

4.1 Incentives

The borough report discussed in Section 3 suggests several dimensions along which offices differed, and which may have acted as substitute incentives for payment. Here we discuss the ones we measure and use in our analysis. We operationalize each incentive as a variable based on our data. In Appendix Section C.4, we derive an alternative measure for each incentive and demonstrate robustness to the specific choice of measure.

Prestige. One way to motivate officers was through prestige. In the report, prestige becomes very clear. Each borough has a separate chapter, and each officer is discussed in order. This order first features the most important officer of the borough. Common titles for this officer are Mayor and Headborough. It then

lists officers that are less important.[8] We measure prestige by examining the *ordering* of individual offices within each borough record in our data source. We use the descending ordering of officers within the borough record as a measure of prestige. Since boroughs vary in their number of officers, we normalize the ranking to lie between zero and and one within each borough.

Career Concerns. Another way to motivate officers was through career concerns. Serving in a borough office was often a stepping stone to become a Member of Parliament. At least 11% of MPs held a borough office at some point in their careers. To measure career concerns, we consider the careers of Members of Parliament. We use the database of biographies of MPs collected by the History of Parliament project (Namier and Brooke, 1964; Thorne, 1986; Fisher, 2009). We process the career paths of all MPs between 1754 and 1832. We record whether a MP held a municipal position and if so, which one. This gives us a list of offices, such as Mayor or Town Clerk, that were stepping stone positions to a career in Parliament. We then record an indicator equal to one if an office is a stepping stone office to measure the potential of career advancement through office holding. On average, about half of distinct offices have ever been held by an individual that subsequently went on to be an MP.

Flexibility. Offices varied in their flexibility of tasks. While each office was usually tied to a clear task, in some boroughs, officers were tasked with a broader range of activities, providing flexibility: a gaoler might have inspected infrastructure in addition to keeping the gaol; a mayor, tasked with governing, could also be involved with justice and infrastructure management. We construct an indicator of whether an officer was appointed by a direct principal (usually a member of the governing council) or not. We derive an office-specific measure of flexibility. First, we measure the modal task assignment of each office. Second, we compute the share of actual tasks that an officer in a borough executes that are outside the modal assignment. The more non-standard tasks an officer executes, the higher this measure is. On average, one third of tasks assigned to an officer are non-standard.

Autonomy. A key margin of officer autonomy was whether open positions were filled by appointment or election. Some officers were directly appointed by the governing body of the borough. Elected officers, on the other hand, had no direct principal.

4.2 Selection

Setting up incentives in the above way suggests that a select body of the population might disproportionately seek these offices. We study advantageous and adverse selection.

Gentry and clergy. Historical evidence suggests that members of the gentry were often found in local

[8] Figures 2-5 and Appendix section C.4 show example pages of our data source.

offices (see e.g. Eastwood (1994)). Similarly, the clergy were thought to be disproportionately involved in local government. We collect data on individuals from Barfoot and Wilkes (1790). This data source records lists of prominent inhabitants of hundreds of towns in England, with their names, social titles, and their borough office, if they held one. This allows us to measure whether, at this point in time, an office in a borough was held by someone with a title.[9] From this data source, we measure an indicator variable equal to one if an office was held by a gentleman, a zero otherwise.

Corruption and nepotism. While individual officers can be positively selected on social status and, perhaps, civic dutifulness, they can also be negatively selected. They may try to use offices for private gain or use the powers of an office to appoint friends and family. In fact, the borough report features many instances of corruption and nepotism. To measure the selection of more corrupt individuals, we focus on a particularly interesting part of our data source. Each borough record includes a discussion of the general management of the borough. This includes discussions of corruption and nepotism, the appointment of favorites and family members. We record an indicator variable equal to one if an office in a borough was associated with cases of corruption, and zero otherwise.[10] We record an indicator for nepotism similarly.

4.3 Incentives and Selection: Descriptive Evidence

We study whether the incentive and selection measures introduced above are correlated with unpaid status. This is informative about which aspects of a job compensate for not getting paid, and about who selects into an unpaid job. We use our dataset of individual officers. Within this dataset, we estimate the following linear model, using OLS:

$$Y_{bo} = \beta u_{bo} + \delta_b + \epsilon_{bo}, \tag{1}$$

where Y_{bo} are the dependent variables introduced above, measured for officer bo in borough b. u_{bo} is an indicator variable equal to one if officer bo is not paid. δ_b is a vector of borough fixed effects. ϵ_{bo} are clustered at the borough level. Tables 3 and 4 report estimated coefficients, which estimate the linear relationship between being unpaid and Y_{bo}.

[9] Unfortunately, no comparable data sources are available closer in time to 1835 when the Municipal Corporation report was compiled.

[10] Appendix Section C.4 shows examples.

4.3.1 Incentives

Table 3 shows results. Across columns we vary outcome variables and the first row of this table provides estimates of β across our four outcomes. In Columns (1) and (2) we study prestige and career concerns. In both regressions, we include borough fixed effects, and we therefore compare unpaid to paid officers, partialling out borough level differences in outcomes and unpaid status. We find that being unpaid is positively correlated with prestige and career concerns. Unpaid officers are, on average, in jobs that are about one-third more prestigious than unpaid officers and that are about fifty percent more likely to be stepping stone jobs to a Parliamentary career.

In Columns (3) and (4) we study the flexibility and autonomy of the jobs held by unpaid and paid individuals. In Column (3) we document a positive correlation between being unpaid and the flexibility of assigned tasks. On average, unpaid officers' task assignments are about a third more flexible than paid officers' assignments. In Column (4) we document that unpaid officers are about 40% more likely to be elected than appointed. We interpret this difference as being consistent with greater autonomy since those appointed have a recorded direct principal.

4.3.2 Selection

Next, we study whether individuals taking up an unpaid job are different from those taking up a paid job. Table 4 reports results of estimating equation (1) using selection outcomes.

In Column (1), we use as the dependent variable an indicator variable equal to one if an officer had a gentry title. We find that unpaid officers are about 60 percent more likely to have a gentlemanly title than paid officers are. In column (2), we study clergy. We find that unpaid officers are, on average, much more likely to be clergy. One percent of officers are members of the clergy on average, but being unpaid increases the probability of being a member of the clergy by two percentage points. In columns (3) and (4) we study corruption and nepotism. We find a positive and significant association between being unpaid and being corrupt or engaging in nepotism. Corruption is five percentage points higher for unpaid officers relative to unpaid officers, compared to a mean of seven percent. For nepotism, we find that unpaid officers are four percentage point more likely to engage in nepotism (mean: 0.05).

In this section we analyzed several margins of selection and characteristics of individual officers that are correlated with being unpaid. We discuss the results in more detail in Section 5.3. The analysis in this section, looking at separate correlations, leaves two questions about the co-movement of incentives and selection unanswered: First, while both incentives and selection are correlated with being unpaid, they may be complements or substitutes at the officer level. Similarly, these incentives and selection criteria

might concentrate in specific tasks. We now investigate these dimensions.

5 A Characterization of the Embedded State

Section 4 analyzes separate correlations between unpaid status, non-monetary incentives, and individual-level selection margins. In this section, we ask whether these elements co-move — whether they together constituted a *system* of borough governance.

The analysis proceeds along two dimensions. First, we assess whether incentives and selection margins functioned as complements or substitutes. We find that unpaid status, incentives, and selection are strongly co-move. Second, we examine whether incentives and selection co-occur across tasks in Section 5.2. We show that indeed unpaid status, incentives, and selection margins concentrate in certain tasks.

Section 5.3 then takes stock of the results from this and the preceding sections. The co-occurrence of incentives and selection characterizes an organizational system which we call the 'Embedded State.' We generalize our findings in a framework that draws on concepts from organizational economics. Using this framework, we discuss a trade-off between notions of integration and control entailed by this organizational form.

5.1 Incentives and Selection Across Officers

We analyze the relationship between incentives, selection, and unpaid status in our officer-level data. Our goal is to assess whether these dimensions co-move systematically — whether they form a broader organizational logic.

To do so, we proceed in two steps. First, we estimate the relationship between incentives and selection. Second, we highlight unpaid status in the resulting incentive–selection space to assess whether unpaid positions occur in particular regions of incentive and selection intensity.

We construct standardized indices for selection and incentives at the officer-by-borough level. Specifically, for officer bo, we normalize each underlying incentive variable to have mean zero and unit variance, then average across the four variables to form a composite index $Incentive_{bo}$, and analogously for the selection index $Selection_{bo}$ (recoding corruption and nepotism so that higher values indicate 'positive' selection).

We construct a binned scatterplot using the following OLS specification:

$$Selection_{bo} = \beta Incentive_{bo} + \delta_b + \epsilon_{bo}. \tag{2}$$

As in equation (1), we include borough fixed effects and cluster standard errors at the borough level.[11] We classify each bin as 'unpaid' or 'paid' based on whether the share of unpaid officers exceeds the population share of unpaid officers.

Figure 6 shows results. The x-axis plots the incentive index, and the y-axis the selection index. Vertical and horizontal lines indicate the respective conditional means. Majority-unpaid bins are represented by blue circles, while red diamonds denote majority-paid bins. We adjust the size of each bin to reflect the number of underlying observations.

The figure shows a strong positive relationship between incentives and selection: nearly all bins fall in either the top-right or bottom-left quadrants. Furthermore, the unpaid–paid classification aligns with this structure: majority-unpaid bins are concentrated in the top-right quadrant, and majority-paid bins in the bottom-left. Thus, unpaid status, above-average incentives and selection systematically co-occur. This suggests strong complementarities between incentives and selection in the keeping of unpaid officers.

5.2 Incentives and Selection Across Tasks

Figure 6 documents strong co-movement of incentives and selection at the officer level. A natural next question is whether similar patterns exist across tasks — i.e., whether certain tasks are systematically associated with strong incentives and selection, while others are not.

To investigate this, we disaggregate unpaid status, incentives, and selection margins by task. For each officer bo and fixed task $\dot{t}$, we define an indicator $w_{bo\dot{t}}$ equal to one if the officer is assigned to task $\dot{t}$. We then estimate the association between this task assignment and various officer characteristics c_{bo} (including unpaid status, incentives, and selection indices) using the following linear model, estimated separately for each task and characteristic:

$$w_{bo\dot{t}} = \beta_0 + \beta_1 c_{bo} + \epsilon_{bo}. \tag{3}$$

The coefficient β_1 captures the extent to which officers with characteristic c_{bo} are disproportionately involved in task t.

[11] Our baseline specification uses 30 bins. Appendix Figure A.1 shows robustness to varying the number of bins $10, 20, 30, 40$. Appendix Table A.1 reports the results of the unbinned regression in equation (2).

We begin by examining heterogeneity in unpaid status across tasks. Panel A of Figure 7 presents estimates of equation (3) with $c_{bo} = Unpaid_{bo}$. Tasks are ordered by the magnitude of the estimated coefficients. The results document substantial variation: tasks such as governing and administering justice are disproportionately staffed by unpaid officers, while clerical work, gaol-keeping, and policing are more likely to be performed by paid officials.

Next, we assess whether the co-movement of incentives and selection documented in Figure 6 also appears across tasks. Specifically, we test whether tasks with a higher prevalence of unpaid officers are systematically associated with stronger non-monetary incentives and selection margins. To this end, we re-estimate equation (3) for each incentive and selection variable c_{bo}, maintaining the task ordering from Panel A to facilitate comparison.

Panel B considers variation in incentive structures. The first figure reports results for prestige. Tasks such as governing and justice score high on prestige, while gaol-keeping and policing score low. The downward slope in the coefficients — mirroring Panel A — indicates that prestige and unpaid status co-move across tasks. This pattern is consistent with the notion of substitutability between monetary and non-monetary rewards: tasks with greater intrinsic or reputational rewards can attract officers even in the absence of pay.

Similar patterns hold for other incentive measures. We observe analogous downward-sloping gradients for career concerns, flexibility, and autonomy. In each case, tasks with higher levels of these non-monetary incentives also exhibit higher shares of unpaid officers.

5.3 The Embedded State

Our results suggest that the English local state aligned office and task assignments with bundled incentive and selection mechanisms. We term this organizational equilibrium the Embedded State.

Benefits. This mode of governance had two major advantages, both owing to the integration of the state within society. The first benefit is financial. Table 3, columns (1) and (2) suggests that the local state substituted monetary compensation by fostering the intrinsic motivation of bureaucrats through prestige (Prendergast, 2007) and career concerns (Tirole, 1994; Dixit, 2002). For instance, is was not uncommon for a gentleman to set his initial steps in public life in his local borough, before standing for election for Parliament. Considering that most boroughs were impoverished, this practice allowed borough government to be larger than it otherwise would have been. A second advantage is selection. Table 4, columns (1) and (2) show that the local state attracted members of the local elite and educated clergymen. Such social embeddedness brought access to material resources and knowledge, and the state could rely on

bureaucrats that would not have joined the service for monetary incentives (Besley and Ghatak, 2005). We substantiate this point empirically in the next section.

In the absence of monetary compensation boroughs relied on alternative incentive mechanisms that shaped the composition of the officer corps. These incentives led to selection of a particular class of officers, gentlemen and clergymen. Together, these findings may explain how the English local government sustained itself at its massive scale, for centuries, without getting paid.[12]

Costs. This organizational form, on the other hand, entailed costs of control for borough government: First, columns (3) and (4) in Table 3 show that autonomy and flexibility were key incentives for unpaid officers. This reliance on autonomy implies that increased oversight was costly. The Embedded State, by design, constrained hierarchical control and monitoring: sustaining intrinsic motivation required granting flexibility and autonomy (Aghion and Tirole, 1997). If an officer was not paid, implementing a very specific procedure, such as closing up the prison every night, was not easily implemented, in contrast to broader assignments such as 'good governance.'

A second cost is adverse selection. Columns (3) and (4) in Table 4 suggest that, absent high-powered formal incentives, networked authority facilitated nepotism and rent-seeking (Becker and Stigler, 1974; Barfort et al., 2019).

A final cost relates to implementation constraints. Figures 6 and 7 highlight the limits of the scope of the embedded state. In policing, for example, each of the non-monetary incentive dimensions associated with unpaid status — prestige, career advancement, flexibility, and autonomy — was systematically weaker. More generally, roles that were low in status and difficult to imbue with intrinsic rewards were unlikely to be filled by unpaid officers. In such cases, financial compensation became necessary to ensure staffing and performance. Thus, certain tasks and offices requiring standardized procedures, formal monitoring, or actions that conflicted with social norms were harder to implement (Besley and Ghatak, 2005).

Taken together, these limitations suggest that the embedded state was a particular, historically developed, organizational equilibrium. Unpaid status was sustainable only where it could be supported by sufficient non-monetary incentives and favorable selection dynamics. Tasks that did not naturally generate such conditions — due to their content, status, or required oversight — relied instead on direct remuneration. This same logic applies in reverse: when the local state sought to limit the autonomy, prestige, or informal influence associated with a task, salaried appointments offered a way to impose discipline and standardization.

[12]These benefits of integration with a social order echo a broader externality-based theory of the boundary of the firm (Coase, 1937).

6 Performance of the Embedded State

We now evaluate how the organizational model of borough government described in Sections 4 and 5 translated into public goods provision of boroughs. Specifically, we compare the performance of paid and unpaid officers in each borough across the seven core borough tasks. Our analysis proceeds in four steps. First, we describe the construction of the borough-task performance data. Second, we present descriptive comparisons of performance outcomes for paid versus unpaid officers. Third, we outline how our empirical strategy addresses issues of estimation and identification. Fourth, we report results and associated robustness checks.

6.1 Measuring Performance

We construct task-level performance measures for all seven functions central to borough governance, as identified in Section 2 and mapped to officers in Section 3.2. For comparability across tasks and boroughs, we binarize each performance variable at the median and report robustness to alternative thresholds in Section 6.4. Appendix Section C.5 provides details and summary statistics.

Governance. To assess overall governance quality, we use the *Analytical Index* of the Municipal Corporations Report, which states whether boroughs are subject to any of eleven types of malfeasance, such as 'neglect,' misconduct,' and corruption.' We count the number of categories applicable to each borough. From this, we derive a 'good governance' variable that is zero if a borough is listed in all malfeasance categories, and eleven if it is listed in none.

Judicial. We measure judicial capacity by the number of courts held in the borough, ranging from zero to nine, as recorded in the Municipal Corporations Report.

Infrastructure. The Municipal Corporations report recorded whether a borough was paved or lit at night. We thus construct a count variable that ranges from zero (neither paved nor lit) to two (both paved and lit), to capture basic public infrastructure provision.

Financial. We measure financial performance with an indicator for whether the borough levied 'borough rates', the primary form of local taxation.

Clerical. Clerical performance is proxied by an indicator for whether the borough kept official accounts, as recorded in the report.

Prison. Boroughs were classified by the quality of their prison facilities as either 'absent,' 'inadequate,' 'adequate,' or 'superior.' We thus construct an ordinal variable ranging from zero ('absent') to four ('superior').

Police. The classification for police follows the same structure as for prisons. Boroughs are categorized as having no police force, or one deemed 'inadequate,' 'adequate,' or 'superior,' which we convert into a four-level ordinal variable.

All resulting count or ordinal performance measures are binarized at the median. We thus derive a unified performance indicator at the borough-task level bt.[13]

6.2 Descriptive Evidence

Our objective is to compare the performance of unpaid versus paid officers across tasks. Using the officer-task linkage described in Section 3.2, we match each officer to task performance of the tasks they are assigned to. To examine unconditional differences in performance, we calculate, for each officer, the mean performance across all tasks to which they are assigned.

Figure 8, Panel A reports officer-level performance averages separately for paid and unpaid officers. Unpaid officers exhibit significantly higher average task performance than their paid counterparts. The difference is statistically significant and economically meaningful.

Panel B controls for borough-level confounders. Specifically, we estimate the relationship between unpaid status and performance after residualizing performance with respect to borough fixed effects. The horizontal axis reports the officer-level predicted probability of being unpaid, while the vertical axis shows residualized performance. We find a positive and statistically significant linear association: moving from a predicted unpaid probability of zero to one is associated with an increase in residualized performance from approximately 0.40 to 0.63.

6.3 Empirical Strategy

Our empirical strategy addresses two central challenges in identifying the effect of unpaid officer status on public goods provision performance.

First, we observe officer-level unpaid status, whereas performance is measured at the borough-task level. To link the two, we consider each borough-task pair bt as a *team* composed of the officers assigned to

[13] As noted, we assess robustness to this binarization approach in Section 6.4.

it (e.g., a town clerk and a mayor engaged in legal work). Following the econometrics of team production (Bonhomme, 2025), we can attribute team-level outcomes to differences in individual characteristics.

Second, officer-task assignments are not random. As shown in Section 5, unpaid officers are more likely to be assigned certain tasks. If such selection correlates with performance, naive estimates will be biased. To address this, we control for a broad range of potential confounders across boroughs and tasks, and additionally draw on plausibly exogenous variation in the likelihood of being unpaid. We discuss our approach in Section 6.3.3.

6.3.1 Main Estimating Equation

In our dataset we observe 277 boroughs (b). For each borough, we record performance on the seven distinct tasks (t), resulting in 1,939 unique borough-task teams, indexed by bt. We observe a total of 5,632 officers (bo) working on at least one team. Officers may work on multiple teams, but always within the same borough. Our empirical strategy rests on three key variables:

First, a performance indicator for each team:

$$Y_{bt} = 1 \text{ if team } bt \text{ performs well, } 0 \text{ otherwise.}$$

We then record an assignment indicator for each officer-team pair:

$$w_{bot} = 1 \text{ if officer } bo \text{ works on team } bt, 0 \text{ otherwise.}$$

Finally, we record unpaid status:

$$u_{bo} = 1 \text{ if officer } bo \text{ is unpaid, } 0 \text{ otherwise.}$$

In Appendix Section D.1, we build on the team production model in Bonhomme (2025) to derive the following officer-task level estimating equation:

$$Y_{bt} = a\, w_{bot} + b\, w_{bot} u_{bo} + X_b\, \mathbb{1}(\tau = t)'\theta + \delta_b + \delta_t + \delta_s + e_{bot}, \tag{4}$$

where b captures difference in performance of unpaid officers, conditional on team assignment and controls: $X_b\, \mathbb{1}(\tau = t)'\theta$ denotes borough coordinate polynomials, X_b, interacted with task indicators $\mathbb{1}(\tau = t)$. δ_b, δ_t, and δ_s are borough, task, and task scope fixed effects, respectively. Task scope refers

to the *combination* of tasks an officer is assigned to. For example, all officers that are governing and are involved in infrastructure management have the same task scope. So do officers that do judicial and law enforcement tasks. Standard errors are clustered at the team (bt) level.

6.3.2 Empirical approach: Team Production

If paid status is assigned exogenously, then we show in the Appendix that Equation (4) allows to estimate the relationship between individual-level paid status and team performance under three key assumptions: (1) no within-team spillovers, (2) no cross-team spillovers, and (3) constant returns to team size.

Appendix Section D.2 addresses potential violations of assumptions (1) and (2) in four ways. First, we assess the robustness of our estimates to alternative clustering levels, such as borough or county, and allow for spatial dependence in the error structure. Second, we account for the mean performance of *other* teams within the same borough, directly capturing potential local spillovers. Third, we restrict the sample to contexts where within-team spillovers are likely limited by focusing on single-member teams. Fourth, we aggregate the data to higher levels: to internalize within-team spillovers, we estimate results at the borough-task (team) level; to address cross-team spillovers, we aggregate to the borough level.

To address potential violations of assumption (3), we take two complementary approaches in Appendix Section D.3. First, we apply the estimator developed by Bonhomme (2025) to directly recover returns to team size. Due to the data intensity of this method, we can implement it only for teams of size up to three. Then, we re-estimate equation (4) using estimated returns. Second, we show that our core results are robust to a wide range of assumed returns-to-size parameters, suggesting that our findings do not hinge on a particular assumption about scale effects.

6.3.3 Empirical approach: Officer-Task Assignment

While Section 6.3.2 outlines conditions under which average differences in individual contributions to team performance can be estimated in general, being paid is not randomly assigned, nor is task assignment. In this section we review three strategies we follow to address these concerns.

Fixed Effects Equation (4) includes a rich set of fixed effects to absorb several sources of variation in performance, paid status, and task assignment. Borough fixed effects δ_b capture differences across boroughs, including variation in resource endowments and the identities of Municipal Report surveyors. Task fixed effects δ_t absorb average differences in task complexity, staffing norms, and compensation structures (e.g., governing may be more complex and differently staffed than lighting or paving). Task scope fixed effects

δ_s account for performance differences associated with the breadth of an officer's responsibilities — e.g., officers assigned to more tasks may perform worse on average. In addition, we can introduce county-by-task fixed effects δ_{ct} to absorb unobserved, county-specific influences on task performance in Appendix Section D.4.

Controls Remaining sources of confounding arise at the borough-task (bt) and officer-task (bot) levels. We address these in four ways. First, equation (4) includes borough coordinate polynomials interacted with task indicators: the term $X_b \, \mathbb{1}(\tau = t)'\theta$ flexibly captures location-specific heterogeneity in task feasibility — for example, revenue collection may be easier in coastal towns, or policing more difficult near London. Second, we can control directly for officer characteristics that may be correlated with performance, such as whether the officer is a Justice of the Peace (Besley et al., 2025). Third, we implement a matching exercise, matching each officer to a nearest neighbor using a full set of borough and officer characteristics. Finally, we can account for potential outliers by leaving out one task at a time from estimating equation (4), or by varying the threshold rules in constructing our binarized performance data. These robustness checks are reported in Appendix Section D.4

Quasi-Exogenous Variation: Affordability Our final strategy is to isolate variation in unpaid status u_{bo} that is plausibly exogenous. We discussed in our background section how most boroughs' revenues were predetermined and low. This means that the predetermined component of borough income which constrained the *affordability* of paying an officer, given a market wage for that officer. We construct a measure of affordability combining wages of officers in other boroughs with a borough's predetermined income. This measure, which describe in detail in Section 6.5, strongly predicts whether officers were paid, yet is balanced across a wide range of borough characteristics. We show that our results remain robust when we instead relate performance to whether an officer was affordable, rather than to whether an officer was actually paid.

6.4 Results: Unpaid officers

Table 5, column (1), presents estimates of equation (4) including borough and task fixed effects. Conditional on an officer being assigned to a specific task t, unpaid status is associated with a performance increase of 0.13 (clustered standard error: 0.02), relative to a mean of 0.59. This effect is statistically significant at the 1% level. In column 2, we add geographic-task interaction controls, and in column 3, we include task scope fixed effects. The estimated coefficients are 0.15 (s.e. 0.02) and 0.18 (s.e. 0.03), respectively. These results mirror the descriptive patterns shown in Figure 8: unpaid officers, on average,

outperform their paid counterparts.

Interpreting $\hat{b}$ as the causal effect of unpaid status on performance requires the identifying assumptions discussed in Sections 6.3.2 and 6.3.3 to be met. Specifically, this requires that spillovers (within and across teams), returns to team size, and borough-task or officer-level characteristics do not jointly influence both performance outcomes and compensation status. We implement robustness checks discussed in Sections 6.3.2 in Appendix Sections D.2 (spillovers) and D.3 (team size). Robustness checks associated with Section 6.3.3 are reported in Appendix Section D.4. Together, this evidence suggests that the observed performance premium among unpaid officers is unlikely to be an artifact of unobserved confounding.

A key concern when interpreting this finding is that not only do embedded incentives and selection compensate to equalize performance, but unpaid officers in fact outperform paid officers. In the Appendix, we apply the standard AKM fixed effects technique to recover individual contributions to team production Abowd et al. (1999). We find that unpaid, and selected from the gentry and clergy, officers are on average higher ability than their paid counterparts. This may explain why, when unpaid status and its concomitant incentives attracts higher status individuals, they subsequently outperform their counterfactual paid counterparts.

The results in this section can be interpreted as causal if being paid is assigned exogenously. In addition to the robustness checks implemented in this section, we isolate a predetermined component of paid status and relate this to performance outcomes.

6.5 Results: Unaffordable officers

In this section we isolate a plausibly exogenous component, v_{bo}, of unpaid status u_{bo}. Our strategy builds on the observation, detailed in Section 2, that boroughs operated under tight fiscal constraints. In particular, a substantial share of borough income derived from rents on inherited assets, primarily land, which were allocated to boroughs in a manner that was predetermined and plausibly unrelated to the decision to compensate an officer or borough performance centuries later. Therefore, the decision to pay officers was partially shaped by predetermined and exogenous features of borough finances.

We operationalize this idea in two steps. First, we compute whether an officer was *affordable* to the borough, given its disposable income and the prevailing market wage. Second, we use the methodology of Borusyak and Hull (2023) to isolate the variation in affordability driven exclusively by the predetermined rental component of borough income.

To implement the first step in four parts: We digitize historical borough balance sheets around the time of the reform to estimate borough income.[14] Using these balance sheets, we estimate the typical

[14]The Municipal Corporations Report provides the first comprehensive survey of borough income, typically averaging accounts

share of borough expenditures allocated to officer salaries. Next, we proxy the prevailing market wage of a given officer by calculating the average salary of paid officers with the same title across all boroughs. For example, the average wage among paid mayors defines the market wage for the mayor of the remaining boroughs where mayors aren't paid. Finally, we construct a salary prioritization scheme. We construct this priority order by calculating, for each officer title, the share of officers in *other* boroughs with that title who were paid. Titles that are paid more frequently receive higher priority. We then use these four components to proxy whether an individual officer was affordable for a borough. We consider officers in sequential rank order. At each step, we check whether the officer's market wage can be covered by the remaining disposable income after accounting for prior salary commitments. This procedure yields an officer-specific affordability prediction v_{bo}.[15]

We rely on total borough income to compute officer-level affordability v_{bo}: the decision to salary an officer was based on all disposable funds available to the borough. One tension is that, only a portion of borough income — rental income from inherited assets — is plausibly exogenous. To isolate variation that originates from this component, we follow Borusyak and Hull (2023) and compute an *expected* affordability measure $\bar{v}_{bo}$. Intuitively, including this variable as a control nets out the variation in unaffordability that is not due to rental income.[16] To construct $\bar{v}_{bo}$, we identify all rental income items in borough budgets. Then, we simulate counterfactual borough rental income by reshuffling these rental income amounts across boroughs. For each reshuffle, we recompute officer affordability. Repeating this process 1,000 times, we calculate the average counterfactual affordability $\bar{v}_{bo}$ for each officer under random rental income configurations. Informally, this variable captures the 'endogenous' aspect of unaffordability for each officer. Including $\bar{v}_{bo}$ as a control in all affordability regressions ensures that our identifying variation arises solely from borough-specific variation in rental income.

Balance. A key testable implication of the historical evidence in Section 2, which indicates that rental income was as good as random, is that officer affordability v_{bo} should exhibit balance with respect to predetermined borough characteristics. Moreover, if v_{bo} captures a more exogenous component of treatment than unpaid status u_{bo}, we should expect v_{bo} to be more weakly correlated with such characteristics than u_{bo}.

from the years preceding the report. We also digitize budget surveys from 1837 and 1838. Our results are not sensitive to the choice of reference year.

[15]For example, consider a borough with ten pounds of disposable income and two officers: a constable (market wage seven pounds) and a mayor (market wage ten pounds). Constables are paid more often than mayors in other boroughs, so the constable is prioritized. Paying the constable costs seven pounds, leaving three pounds. The mayor's wage cannot be covered, so $v_{bo} = 0$ for the mayor, and $v_{bo} = 1$ for the constable.

[16]Since boroughs used total disposable income to decide on their organizational structure, we cannot compute affordability using rental income only. This is similar to a broad class of contexts in which a *component* of the variable is exogenous, but not the variable as a whole (Borusyak and Hull, 2023).

To evaluate this, we estimate the following linear model using OLS:

$$x_{bo} = \beta_0 + C_{bo}\Gamma + \varepsilon_{bo}, \tag{5}$$

where $x_{bo} \in \{u_{bo}, v_{bo}\}$ is either an indicator for whether officer bo was unpaid or a predicted indicator for unaffordability, and C_{bo} is a vector of borough-level covariates. All covariates are standardized for comparability. When $x_{bo} = v_{bo}$, we include expected affordability $\bar{v}_{bo}$ as an additional control to net out variation that is not attributable to borough-specific rental income.

Figure 9 summarizes the results. Panel A confirms that observed unpaid status ($u_{bo} = 1$) is systematically associated with several borough characteristics: boroughs that are more distant from the border, that paid less Lay Subsidy Tax in 1332, and that had lower wheat yields, as well as fewer gentlemen in 1370 and fewer noblemen in 1680. While these coefficients are statistically significant, their magnitudes are modest.

Panel B, by contrast, shows that predicted unaffordability v_{bo} is not significantly related to any of these characteristics. All estimated coefficients are well below 0.1 standard deviation, and estimated coefficients are insignficant. This balance supports the interpretation of v_{bo} as a plausibly exogenous source of variation in officer payment status.

Results. We now estimate the main regression equation (4), replacing observed unpaid status u_{bo} with predicted unaffordability v_{bo} and controlling for expected unaffordability $\bar{v}_{bo}$. Table 6 presents these results in the same structure as Table 5. In the most stringent specification (column 3), unaffordability is associated with an increase in officer performance of approximately 0.12 standard deviations, relative to a sample mean of 0.59. The size of this effect is comparable to the effect sizes we found in the previous section.

A final remaining concern is that our endogenous variable of interest is that boroughs may just not appoints certain officers, anticipating that they may have to pay them. We study this issue in Appendix Section D.5, by subsetting to officers explicitly mentioned in the borough charter, and to their modal tasks. These officers were always appointed, and their modal tasks predetermined. Repeating our analysis using just charter officers and modal tasks, our results are qualitatively similar.

7 Conclusion

What explains the large variation in the performance of government around the world? Most contributions focus on the organization and staffing of the salaried public administration (Besley et al., 2022; Finan et al., 2017). In this paper we identify another dimension of government: the unsalaried individuals who perform tasks that today would be executed by salaried bureaucrats. The state extends, as it were, into society and is embedded in society.

We characterize the incentives that sustain the embedded state in the context of early modern government in England. England's central, salaried government was small relative to all the mayors, justices of the peace, town clerks, and overseers of the poor that ran the judicial system, built roads, repaired churches, resolved disputes, and presided over town and village meetings. We also study takes up unpaid jobs and find that a particular layer of society, made up of those with a cultural affinity for public service, self-selects into unpaid public service. They take advantage of the opportunities office affords, which range from career opportunities to opportunities for self-enrichment and nepotism, while dedicating their time to public service.

When we compare paid to unpaid officers, we find that unpaid officers outperform paid officers in terms of public good provision. This result is in part driven by the fact that the individuals who self-select into unpaid public office are from the higher layers of society.

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Figure 1: Local Organizational Units



Panel A: Parish Panel B: Borough Panel C: County

Note: Panels map the three tiers of local government in England. Panel A plots all parishes in England and Wales, using GIS data from Kain and Oliver (2001). Panel B plots all towns in the same region, with the sample surveyed in the Municipal Corporations report in dark gray. Panel C shows county boundaries.

Figure 2: East Looe Officer List

Recorder. The Recorder is appointed by the mayor and capital burgesses, being the common council of the borough, or the major part of them. He holds his office so long as he shall well behave himself. He is required by the charter to be an able, honest and fit person. He is a justice of the peace for the borough, and may appoint a deputy who is also a justice of the peace. It has not been usual to appoint a barrister to the office, which has, in fact, been generally bestowed upon the patron of the borough, or some one nominated by him. The following is a list of the recorders, since the year 1754:

1754: The Rev. J. Buller.
1786: The Rev. W. Buller.
1797: Dr. W. Buller, bishop of Exeter.
1797: William Graves, esq.
1802: Edward Buller, esq.
1802: John Buller, esq.
1807: Edward Buller, esq.

The present recorder is John Drummond Buller Elphinstone, esq. He resides in Hertfordshire, and was formerly an officer in the guards. His age is between 40 and 50. He formerly resided near the borough, and was then in the habit of sitting as a magistrate.

The deputy recorder is Thomas Hope, esq. He resides at Trenant Park, near Looe, and in Duchess-street, London. He was appointed on the 29th September 1830. He has not since his appointment performed the usual duties of his office.

Town Clerk. The Town Clerk or Common Clerk of the courts within the borough is nominated by the recorder; he is clerk of the peace, clerk to the magistrates, and solicitor to the corporation; he receives a salary of 15*l.* per annum, and the other emoluments of his office do not exceed 20*l.* The present town clerk is Mr. William Tickell, solicitor, aged 44; he has filled the office for seven or eight years.

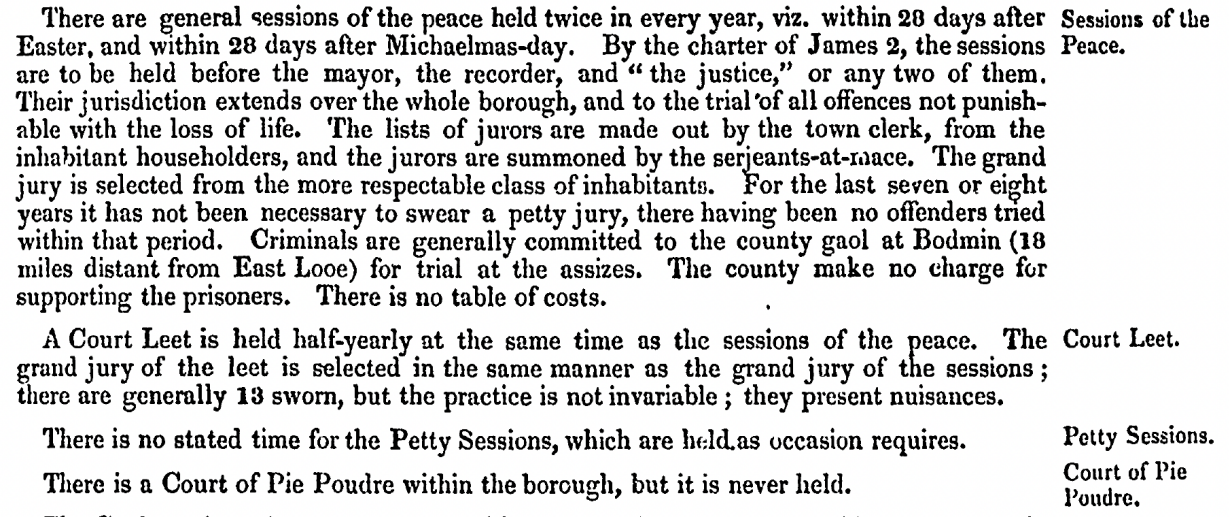
Serjeants at Mace. There are two Serjeants-at-Mace for the execution of precepts, mandates, attachments, and other process within the borough; they also attend upon the mayor; they receive a stipend of 2*l.* 6*s.* 6*d.* each in lieu of cloaks and hats.

Constables. There are nine Constables; they are appointed by the court leet.

Quay Master. The Quay Master is appointed by the corporation; he collects the quay dues and ballast dues, and has the general superintendence of the quays; he also collects the market dues; he receives a salary of 10*l.* per annum.

Note: Figure presents an example officer list from the municipal report chapter on East Looe. Officers' method of appointment is highlighted in gray; task assignments in yellow; and remuneration in turquoise.

Figure 3: East Looe Courts



There are general sessions of the peace held twice in every year, viz. within 28 days after Easter, and within 28 days after Michaelmas-day. By the charter of James 2, the sessions are to be held before the mayor, the recorder, and "the justice," or any two of them. Their jurisdiction extends over the whole borough, and to the trial of all offences not punishable with the loss of life. The lists of jurors are made out by the town clerk, from the inhabitant householders, and the jurors are summoned by the serjeants-at-mace. The grand jury is selected from the more respectable class of inhabitants. For the last seven or eight years it has not been necessary to swear a petty jury, there having been no offenders tried within that period. Criminals are generally committed to the county gaol at Bodmin (18 miles distant from East Looe) for trial at the assizes. The county make no charge for supporting the prisoners. There is no table of costs. Sessions of the Peace.

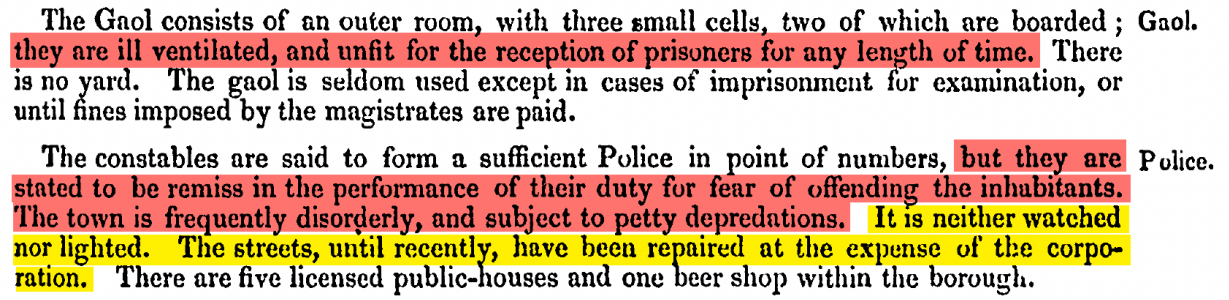
A Court Leet is held half-yearly at the same time as the sessions of the peace. The grand jury of the leet is selected in the same manner as the grand jury of the sessions; there are generally 13 sworn, but the practice is not invariable; they present nuisances. Court Leet.

There is no stated time for the Petty Sessions, which are held as occasion requires. Petty Sessions.

There is a Court of Pie Poudre within the borough, but it is never held. Court of Pie Poudre.

Note: Figure presents the list of courts in East Looe. Here, the Sessions of the Peace (quarter sessions), Court Leet, and Petty Sessions are active, while the Court of Pie Poudre is defunct.

Figure 4: East Looe Performance



The Gaol consists of an outer room, with three small cells, two of which are boarded; they are ill ventilated, and unfit for the reception of prisoners for any length of time. There is no yard. The gaol is seldom used except in cases of imprisonment for examination, or until fines imposed by the magistrates are paid. Gaol.

The constables are said to form a sufficient Police in point of numbers, but they are stated to be remiss in the performance of their duty for fear of offending the inhabitants. The town is frequently disorderly, and subject to petty depredations. It is neither watched nor lighted. The streets, until recently, have been repaired at the expense of the corporation. There are five licensed public-houses and one beer shop within the borough. Police.

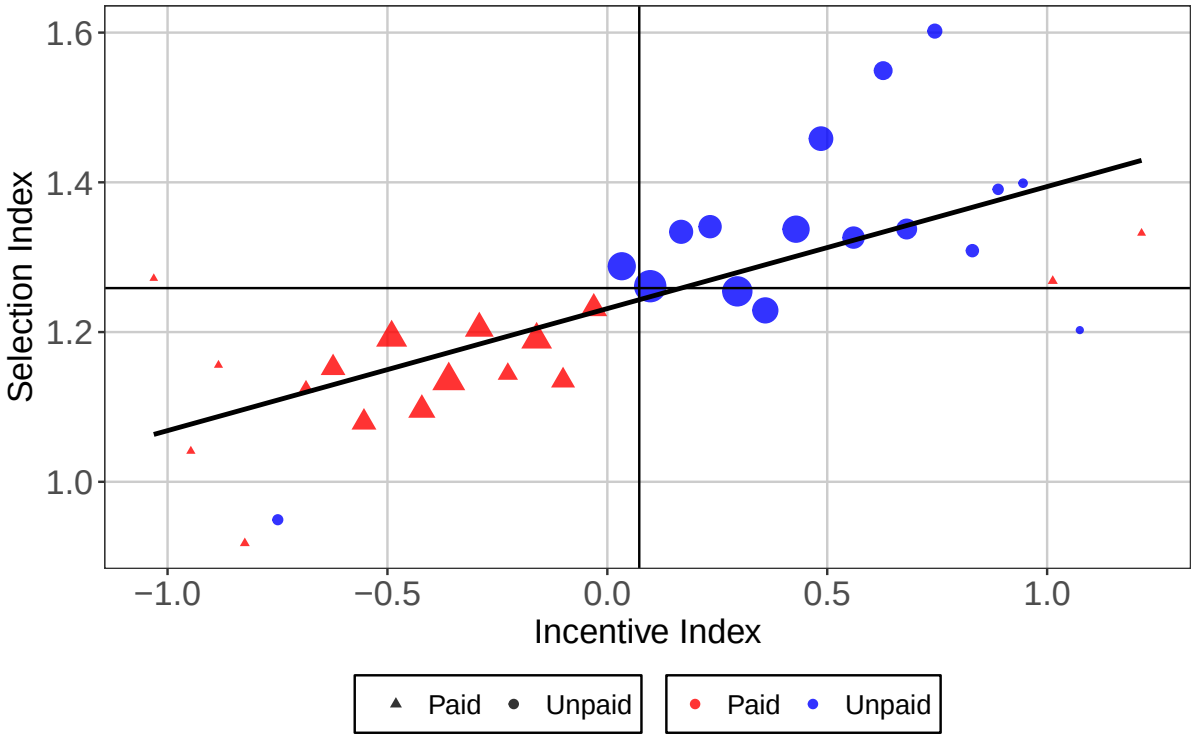
Note: This figure discusses the performance of three local public goods in East Looe: the prison, the police, and infrastructure. The former two are highlighted in red, the latter in yellow. The gaol is inadequate for holding prisoners. The police are also unable to keep public order. For infrastructure, the streets are paved but not lit.

Figure 5: East Looe Accounts

	£.	s.	d.
Rents of houses, meadows and lands, chiefly high, and conventionary rents	31	–	
Quay dues	23	16	3
Market dues	14	3	3
Ballast dues	14	2	–
The waste	–	15	–
The town soil	17	–	–
£.	100	16	6

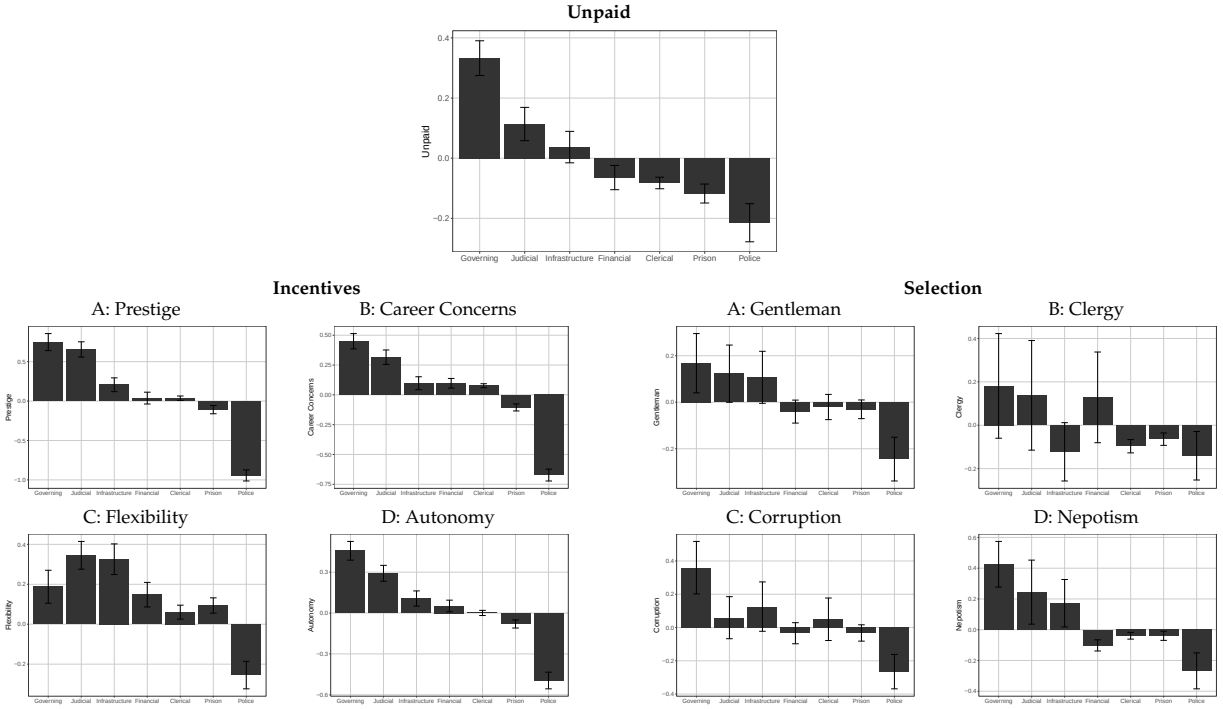
Note: Figure presents line-by-line *revenue* accounts for East Looe (expenditures not pictured). As was common, rents on property were the largest source of corporate income, but the town was also able to tax maritime trade.

Figure 6: The Embedded State Within Boroughs



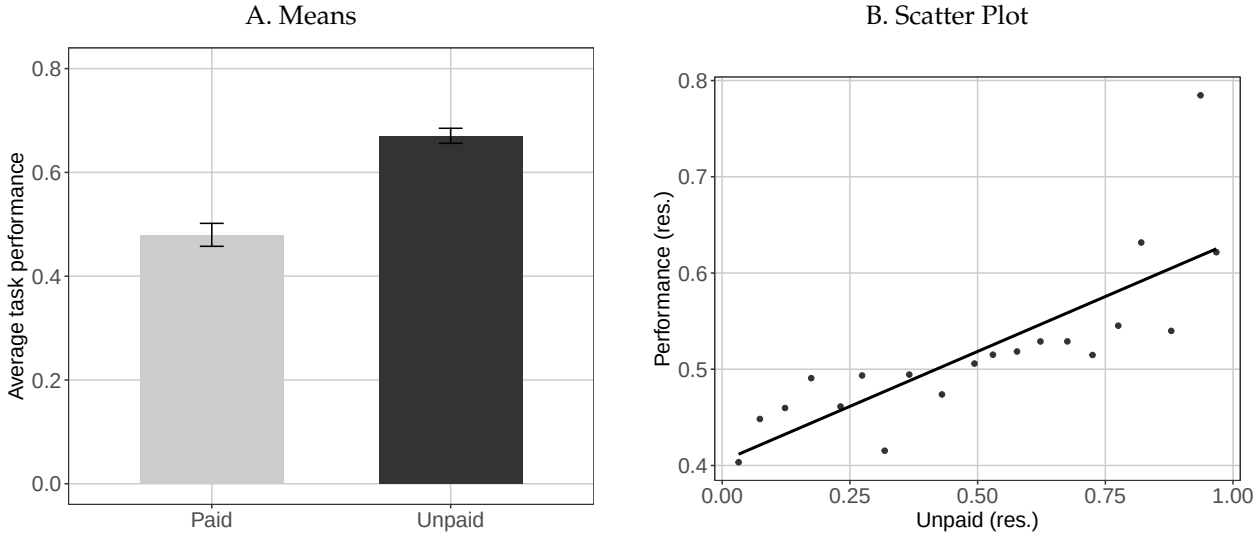
Note: Figure presents results of estimating equation (2) in a binned scatterplot. The x-axis plots the incentive index, and the y-axis the selection index introduced in Section 4. Vertical and horizontal lines indicate the respective conditional means. Majority-unpaid bins are represented by blue circles, while red diamonds denote majority-paid bins. We adjust the size of each bin to reflect the number of underlying observations. Observations are at the level of an officer. The sample comprises of 5,095 officers.

Figure 7: The Embedded State Across Tasks



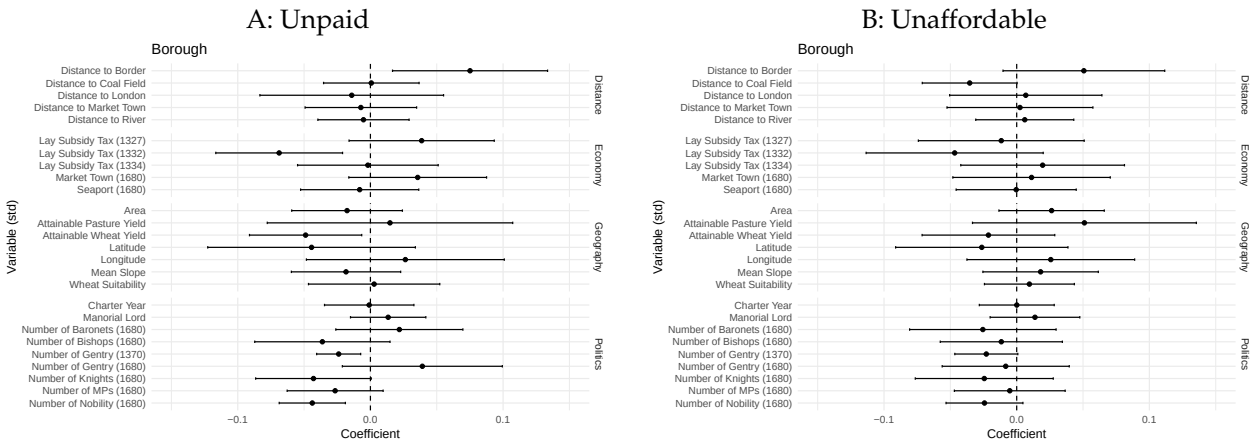
Note: Figure presents results of estimating equation (3), with 95 percent confidence intervals. Observations are at the level of an officer. The sample comprises of 5,095 officers. Standard errors are clustered at the borough level. The dependent variables are the incentive and selection measures introduced in Section 4.

Figure 8: Officer Performance and Paid Status



Note: This plot shows (Panel A) officer-level performance averages separately for paid and unpaid officers, with 95 percent confidence intervals, and (Panel B) results of estimating the relationship between unpaid status and performance after residualizing performance with respect to borough fixed effects. The horizontal axis reports the officer-level predicted probability of being unpaid (i.e., unpaid propensity), while the vertical axis shows residualized performance, in a binned scatterplot. Observations are at the level of an officer. The sample comprises of 5,095 officers. The dependent variable is the mean performance across all tasks to which an officer is assigned, as introduced in Section 6.

Figure 9: Borough Characteristics



Note: Figure presents results of estimating equation (5), with 95 percent confidence intervals. Observations are at the level of an officer. The sample comprises of 5,095 officers. The dependent variables are unpaid status (Panel A) or unaffordability status (Panel B). Standard errors are clustered at the borough level.

Table 1: Comparing the Central and Local State: Size and Paid Status

	Total size		% Male pop.		% Unpaid
	1700	**1835**	**1700**	**1835**	**1835**
Central	4,920	21,305	0.33	0.63	0.00
Parish	50,000	95,520	3.33	2.81	100.00
County	25,084	40,994	1.65	1.20	90.30
Borough	7,660	12,268	0.51	0.36	70.69
Borough (our sample)	—	5,095	—	0.15	85.42
Total (Local)	82,744	148,782	5.52	4.38	94.91

Note: Columns show totals and shares of adult male population for central and local government officers in 1700 and 1835, and the share of local officials who were unpaid in 1835. Central government figures are from Brewer (1989) (1700) and Cook and Keith (1975) (1835). Local government data draw on Goldie (2001), Landau (1984), and original data collected for this project. Percent male population = total divided by adult male population. Total (Local) sums rows 2–4.

Table 2: Common Local Offices by Organizational Unit

Parish	Borough	County
Overseer of the Poor	Mayor	Sheriff
Churchwarden	Alderman	Militia Officer
Constable	Town Clerk	Justice of the Peace

Note: This table displays three of the most common characteristic offices for each level of local government. Note that they are not necessarily the *most* common; for the borough, the most common office was also the constable, and we have also here omitted the serjeant-at-mace.

Table 3: Officer Incentives

	Job Aspects		Task Aspects	
	Prestige	Career Concerns	Flexibility	Autonomy
	(1)	(2)	(3)	(4)
Unpaid	0.16***	0.25***	0.12***	0.20***
	(0.02)	(0.04)	(0.04)	(0.04)
Observations	5,095	5,095	5,095	5,095
R^2	0.23	0.25	0.28	0.30
Boroughs	258	258	258	258
Officers	5,095	5,095	5,095	5,095
Outcome Mean	0.45	0.53	0.33	0.52
Cluster	Borough	Borough	Borough	Borough
Borough fixed effects	✓	✓	✓	✓

Note: Table presents results of estimating equation (1). Observations are at the level of an officer. The number of officers in each sample is indicated in the table. Standard errors are clustered at the borough level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variables are the incentive measures introduced in Section 4.

Table 4: Officer Selection

	Advantageous		Adverse	
	Gentleman	Clergy	Corruption	Nepotism
	(1)	(2)	(3)	(4)
Unpaid	0.13**	0.02***	0.05**	0.04***
	(0.06)	(0.007)	(0.02)	(0.01)
Observations	1,521	1,521	5,095	5,095
R^2	0.43	0.22	0.39	0.53
Boroughs	158	158	258	258
Officers	1,521	1,521	5,095	5,095
Outcome Mean	0.40	0.01	0.07	0.05
Cluster	Borough	Borough	Borough	Borough
Borough fixed effects	✓	✓	✓	✓

Note: Table presents results of estimating equation (1). Observations are at the level of an officer. The number of officers in each sample is indicated in the table. Standard errors are clustered at the borough level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variables are the selection measures introduced in Section 4.

Table 5: Unpaid and Performance

	Performance		
	(1)	(2)	(3)
Unpaid Officer on Team	0.13***	0.15***	0.18***
	(0.02)	(0.02)	(0.03)
Observations	35,665	35,665	35,665
R^2	0.25	0.31	0.32
Boroughs	258	258	258
Officers	5,095	5,095	5,095
Tasks	7	7	7
Outcome Mean	0.59	0.59	0.59
Cluster	Borough × Task	Borough × Task	Borough × Task
Task Control	✓	✓	✓
Controls		✓	✓
Borough fixed effects	✓	✓	✓
Task fixed effects	✓	✓	✓
Task Scope fixed effects			✓

Note: Table presents results of estimating equation (4). Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, as introduced in Section 6.

Table 6: Unaffordable and Performance

	Performance		
	(1)	(2)	(3)
Unaffordable Officer on Team	0.08**	0.08**	0.09**
	(0.04)	(0.03)	(0.04)
Observations	35,665	35,665	35,665
R^2	0.24	0.31	0.31
Boroughs	258	258	258
Officers	5,095	5,095	5,095
Tasks	7	7	7
Outcome Mean	0.59	0.59	0.59
Cluster	Borough × Task	Borough × Task	Borough × Task
Task Control	✓	✓	✓
Controls		✓	✓
Borough fixed effects	✓	✓	✓
Task fixed effects	✓	✓	✓
Task Scope fixed effects			✓

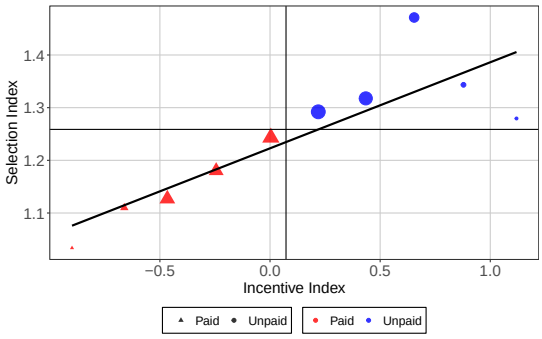
Note: Table presents results of estimating equation (4), replacing observed unpaid status u_{bo} with predicted unaffordability v_{bo} and controlling for expected unaffordability $\bar{v}_{bo}$. Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, as introduced in Section 6..

Supplementary Appendix: For Online Publication

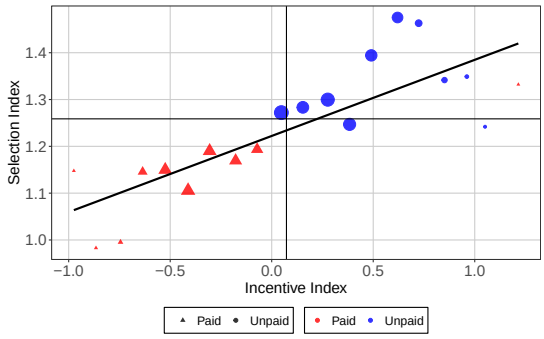
A Tables and Figures

Figure A.1: The Embedded State Within Boroughs (Varying Bins)

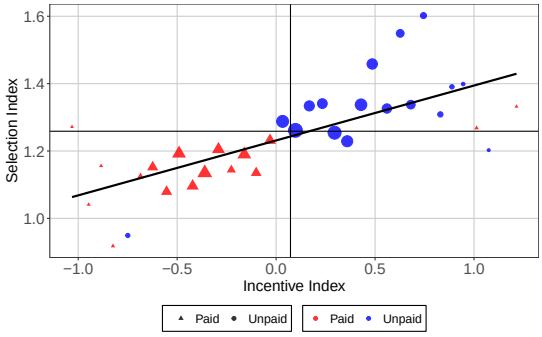
A: 10 Bins



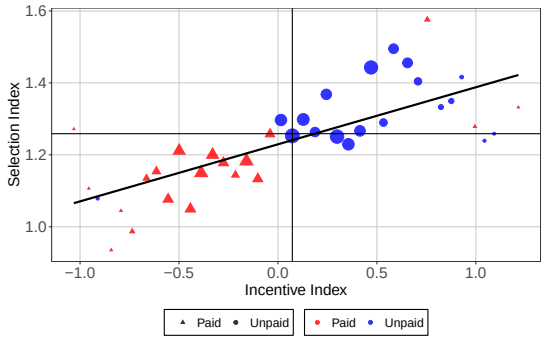
B: 20 Bins



C: 30 Bins



D: 40 Bins



Note: Figure presents results of estimating equation (2) in a binned scatterplot using 10, 20, 30, and 40 bins, respectively, in Panels A–D. The x-axis plots the incentive index, and the y-axis the selection index introduced in Section 4. Vertical and horizontal lines indicate the respective conditional means. Majority-unpaid bins are represented by blue circles, while red diamonds denote majority-paid bins. We adjust the size of each bin to reflect the number of underlying observations. Observations are at the level of an officer. The sample comprises of 5,095 officers.

Table A.1: The Embedded State Within Boroughs

	Selection Index		
	(1)	(2)	(3)
Incentive Index	0.20***	0.20***	0.19***
	(0.03)	(0.03)	(0.03)
Observations	5,095	5,095	5,095
R^2	0.06	0.06	0.50
Boroughs	258	258	258
Outcome Mean	-0.03	-0.03	-0.03
Cluster	Borough	Borough	Borough
Controls		✓	✓
Borough fixed effects			✓

Note: Table presents results of estimating equation (2). Observations are at the level of an officer. The sample comprises of 5,095 officers. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. . The dependent variable is is the selection index introduced in Section 4.

B The Local State: Details

B.1 Estimating the Size of the Local State

In section, we explain our rough estimates of the size of the English local state in 1700 and 1835, building on work by Goldie (2001, pp. 161-62) with original data from this project. We then make comparisons with the size of the central 'Weberian' administration using data on government bureaucrats in 1708 and 1832 from Brewer (1989) and Cook and Keith (1975). No exact tabulations of local officeholders were made in 1835, let alone 1700, so producing even imprecise figures for each year requires investigation of each of the three major tiers of local government:

1. County officials
2. Parish officials
3. Borough officials

We discuss each category in turn.

County Government

Goldie (2001, p. 162) offers rough figures for three main categories of county-level officials, offering Rudolf van Gneist's estimates for these totals in 1800: "In addition, he reckoned 10,000 assize and quarter sessions jurors at each sitting, 8,000 militia officers and 3,800 active JPs."

From Landau (1984, pp. 367-73), we can improve on the number of JPs for 1670-1761; these totals are listed in Table B.1. Note that these constitute the number of members of the Commission of the Peace, not necessarily active JPs. The number for 1829 comes from House of Commons (1829).

Year	1670	1702	1761	1829
JPs	2570	3700	8478	19610

Table B.1: JP counts across England and Wales (Landau, PP).

van Gneist conjectured that there were 8,000 militia officers in 1800; an 1828 Parliamentary report gives a total of 5,781 officers and 50,888 privates (House of Commons, 1828). This figure seems difficult to improve upon for 1700.

As for assize and quarter sessions jurors, there were 212,335 men *eligible* to serve on juries in 1835, but we do not know the actual number serving (House of Commons, 1836). For the present, then, we assume that van Gneist's total of 10,000 was static across both years.

On top of JPs, militia officers, and jurors, there were a litany of smaller offices.

- **High Constables (unpaid):** There was nominally one high constable per hundred or equivalent, and there were roughly 1,438 hundreds in England and Wales in both 1700 and 1835. We consequently take 1,438 to be the total across all counties.
- **Sheriff (unpaid):** There was one sheriff for each of the 52 counties in England and Wales.
- **Coroner (unpaid):** A Parliamentary report for 1839 found that there were 148 county coroners for England and Wales (House of Commons, 1840).
- **Custos Rotulorum (paid):** 52 — one per county
- **Lord Lieutenant (paid):** 52 — one per county. The offices of Lord Lieutenant and Custos Rotulorum were unified in 1836, but at the time of the Municipal Corporations report, they were at least nominally distinct.
- **Militia Staff officers (paid):** According to a 1828 Parliamentary report, there were 2,841 militia staff in that year. This category encompasses the quartermaster, paymaster, surgeon, adjutant, and others (House of Commons, 1828).
- **Clerk of the Peace (paid):** There appears to have been one clerk of the peace per county quarter sessions.
- **Gaol Keeper (paid):** There were 968 prison staff, essentially all paid, working in county gaols and houses of correction in 1833. Common offices include the gaoler, turnkey, matron, and chaplain (House of Commons, 1833).

We make the unrealistic assumption (for lack of an alternative) that the local state did not grow between 1700 and 1835 in all categories for which we do not have prior data. Summing up, therefore, we have 25,084 county officers in 1700 and 40,994 in 1835, of which 84.2 and 90.3 percent, respectively, were paid. The former figure is almost certainly too low, because it seems probable that the paid prison establishment was significantly smaller in 1700.

Parish Government

Goldie (2001, pp. 161-62) offers the following estimate for the number of parish officers in 1700 and 1800: "In the seventeenth century, there were approximately 9,700 parishes in England and Wales. If each had one constable, two churchwardens, and two overseers, then we have a total of around 50,000 parish officers at any one time. Thus, around the year 1700, about one-twentieth of adult males were governing in any year; in principle, that might mean one-half were governing in any decade.

Rudolf van Gneist estimated that around the year 1800, there were 14,000 parishes and townships annually choosing at least one constable, one surveyor, two churchwardens, and two overseers, so that perhaps 100,000 people held office."

For 1700, we take Goldie's suggested five officers and roughly 10,000 ancient parishes to be our baseline. For 1835, assuming each parish had approximately six officers, we need only calculate the number of parishes in that year and multiply the two figures. In the 1831 census, there were around 15,920 parishes in England and Wales. These figures give us the total number of officers for that year as follows:

Estimate for 1835:

$$\text{15,920 parishes} \times 6 \,\text{officers} = 95,520 \,\text{parish officers in any year}$$

This estimate is almost certainly a lower bound because many parishes also had such offices as the clerk, beadle, sexton, scavenger, reeve, hayward, and pinder. Additionally, there may have been more of the statutory four offices described above—e.g. two surveyors of highways or up to four overseers of the poor. We assume, for lack of data, that parish officers were uniformly unpaid, though it seems plausible that some would have been remunerated through fees or in-kind payments, even if salaries were uncommon.

Borough Government

We have the number of officers for 277 municipal boroughs. These boroughs, however, represent only a subset of the 1,050 towns in recorded in the 1841 census. Urban governance was patchy at best outside of the chartered corporations, historically a mix of parish and manorial officers, though some expanding industrial towns passed Local Acts establishing commissions for policing and sanitation. Manchester (more populous than any municipal borough in 1841), for example, was governed by a manorial court leet, which appointed a boroughreeve and constables to enforce its bylaws. These officers were supplemented

in 1792 under a Local Act that enabled the raising of a police rate to fund lighting, paving, cleansing, drainage, street widening, and the night watch.

To estimate the aggregate size of urban government in England and Wales, we match our boroughs to population data for all towns in the late seventeenth century from Bennett (2012). For 1835, we use town populations from the 1841 census. We then crudely predict the number of officers in each town outside our sample based solely on population. To account for the lower intensity of governance outside our sample, we assume that towns smaller than the median municipal borough in 1841 had no officers (outside of parish officials), and that non-municipal boroughs smaller than the median 1841 municipal population had 50% of the predicted number of officers. For 1835, we combine the actual numbers of officers from the 277 boroughs in our sample with the predictions for the remaining above our median sample size. The numbers for 1700 are all predicted from the late seventeenth-century population figures. From this exercise, we get:

- **1700**: ∼7,659 municipal officers
- **1835**: ∼12,267 municipal officers

These estimates are probably conservative, but as a lower bound, one could consider just the officers employed in municipal boroughs whose tasks we directly observe. This comes out to 5,095 officers, which we get directly from the municipal report.

Summing Up:

Adding together the county, parish, and borough government tiers, we get the following totals for 1700 and 1835:

- **1700**: 7,659 borough + 50,000 parish + 25,084 county = 82,743
- **1835**: 12,267 borough + 95,520 parish + 40,994 county = 148,781

Central Bureaucratic State

We know from Brewer (1989) that about 4,920 paid central officials were employed in 1708 across the military and fiscal bureaucracies (especially excise and customs). For the early nineteenth century, we have Table B.2 from Cook and Keith (1975, p. 150), which gives us 21,305 paid civil servants in 1832.

Table B.2: British Civil Service employment, 1797–1914

Year	Civil Service employment	Per thousand population	Notes
1797	16,267	1.83	
1815	24,598	2.42	
1821	27,000	2.25	
1832	21,305	1.53	
1841	16,750	1.05	(excludes clerks, messengers, etc.)
1851	39,147	2.18	
1861	31,943	1.59	
1871	53,874	2.37	(includes some workmen)
1881	50,859	1.96	(excludes telegraph, telephone services)
1891	79,241	2.73	
1901	116,413	3.58	(includes General Post Office)
1914	280,000	6.86	(includes Scotland)

Sources: Table 3.1 from Hanlon (2024). Original civil service employment data from Cook and Keith (1975, p. 150); population data from Mitchell & Deane (1962), corresponding to England and Wales except in 1914, which includes Scotland.

Summary Table

Table B.3 below combines our estimates of the numbers of central and local officials employed in any single year. We are excluding for both years A) the rank-and-file of the militia and B) the entirety of the regular army and navy, though we do retain clerks in the military establishment.

In both years, local government dwarfs Whitehall—by nearly 17 times in 1700, and by seven times even after the eighteenth-century expansion of the English fiscal state documented by Brewer (1989) and others. To get a sense of the relative scale of the relational state, we divide our totals by the size of the male population of England and Wales in each benchmark year. There is no exact data for 1700, a century before the first census, but If we go off Wrigley et al. (1997) and Keibek (2017) suggest that the actual total was likely around 1.5 million (not the 1 million used by Goldie). There were 3,394,638 adult males reported in the 1831 census. We then represent each category of local (as well as central) government as a share of the adult male population in 1700 and 1835 in columns three and four.

Building upon the previous discussion, we can also estimate the fraction of employees who were unpaid in 1835, and thus informally organized. As noted above, we assume that all parish employees were unsalaried, and we found that 91 percent of county officers received no salary. In our sample of boroughs, we found that 73.8 percent of borough officers were unsalaried. Extrapolating the number of unsalaried officers based on population and dividing based on the total number of officers for the rest of the English and Welsh boroughs, we find that around 70.7 percent of borough officeholders were unpaid. These estimates are reflected in Table B.4.

Category	Total		% male pop.	
	1700	**1835**	**1700**	**1835**
Central	4,920	21,305	0.33	0.63
Parish	50,000	95,520	3.33	2.81
County	25,084	40,994	1.67	1.21
Borough	7,660	12,268	0.51	0.36
Total (Local)	82,744	148,782	5.52	4.38

Table B.3: Total numbers and population shares of central and local officers in 1700 and 1835 (% male population = total/adult male population in year t). Total Local sums rows 2-4.

	Total size		% Male pop.		% Unpaid
	1700	**1835**	**1700**	**1835**	**1835**
Central	4,920	21,305	0.33	0.63	0.00
Parish	50,000	95,520	3.33	2.81	100.00
County	25,084	40,994	1.65	1.20	90.30
Borough	7,660	12,268	0.51	0.36	70.69
Total (Local)	82,744	148,782	5.52	4.38	94.91

Table B.4: Totals, (male) population shares, and 1835 unpaid shares by category.

B.2 Tenure and Rotation

Goldie (2001, p. 161) offers another, slightly different perspective on the scale of local government: "[A]n astonishingly high proportion of early modern people held office. This can readily be deduced schematically. In the seventeenth century there were approximately 9700 parishes in England and Wales. If each had one constable, two churchwardens and two overseers, then we have a total of around 50,000 parish officers at any one time. Thus, around the year 1700, about one-twentieth of adult males were governing in any year; in principle, that might mean one half were governing in any decade."

Goldie's estimates about the proportion of the male population employed on an annual/decadal basis imply that A) there were a million adult males in 1700 and B) that the rotation of parish officers was more or less annual. We improve on those figures on two dimensions: first, we use the more accurate adult male population figure of 1.5 million from Wrigley et al. (1997) and Keibek (2017), and second, we study the rotation of officers and magistrates documented in Great Britain. Parliament. House of Commons (1834) to find that annually-rotated offices like the mayoralty usually changed hands 6-8 times within a decade.

We start with the assumption that offices that are *not* life-tenured have seven unique holders per decade. From our digitization of the Municipal Corporations report, we know that 30.78 percent of officers are life-tenured. We assume that these have one holder per decade, although in practice, there was almost always some rotation induced by death or retirement. Finally, we have the three categories of county officials: JPs, militia officers, and jurors. We conservatively assume that JPs, militia officers, and the other miscellaneous county offices were rotated once per decade. Given the vast discrepancy between the number of eligible jurors and the number required, rotation was probably frequent in that category.

So, as a first pass, we assume for local government that:

1. **borough officers**: 31% 1 holder per decade, 69% 7 holders per decade
2. **JPs, militia officers, other county offices**: 2 holders per decade
3. **jurors**: 10 holders per decade
4. **parish officers**: 7 holders per decade

For 1700, then, we see a grand total of 546,350 officeholders, and for 1835, we get 938,297.

Taking the population figure of 1,500,000 for 1700, our calculations suggest that 36.4% of adult males held some local office in any given decade. The 1831 census reported 3,394,638 adult males in England and Wales; this gives us 27.6% of adult males in local government.

Central Government

How often did central government employees rotate? Brewer (1989, p. 66) wrote that "Employment in administration not only offered prospects but also came, in some departments, to offer security of tenure and promotion on the basis of seniority. Once the political purges of the late seventeenth and early eighteenth century had ended, an assiduous officer in such departments as the Treasury could look forward to an undisturbed career culminating in promotion to the post of senior clerk. (Between 1714 and 1800 only one senior clerk and four under-clerks in the Treasury were dismissed from office.) Not every department was so kind to its employees—dismissal rates in the Excise ranged between 2 and 9 per cent per annum—but in many central offices the acquisition of a post meant security for life."

However, this seems to have been less frequently the case early on in the eighteenth century; Brewer writes that "Security of tenure, longevity of service and departmentalism emerged only gradually ... This

fluidity was facilitated by the frequent turnover in government personnel occasioned by the political purges of the 1690s. Twenty-two of the thirty-eight customs commissioners appointed between 1688 and 1715 served for five years or less. The comparable Excise figure was twenty of thirty-seven Board members. Excise commissioners appointed before 1715 held their appointments for less than half the time of those who took office after the Hanoverian Succession" (Brewer, 1989, pp. 67-68).

We conservatively assume that central offices turned over once per decade (or every five years, either because of firings/political patronage or promotion. Then two individuals would hold each central government position in a given decade, giving us 9,840 officeholders in 1700 and 42,610 in 1835, or 0.66 and 1.3% of the adult male population of England and Wales, respectively.

Putting our estimates together, we arrive at the following table:

Category	**Total**		**% decadal male pop.**	
	1700	**1835**	**1700**	**1835**
Central	4,920	21,305	0.33	0.63
Parish	50,000	95,520	23.33	19.70
County	25,084	40,994	8.36	4.80
Borough	7,660	12,268	2.62	1.86
Total (Local)	82,744	148,782	36.42	27.64

Table B.5: Central and local officers as shares of *decadal* adult-male population.

C Data: Details

C.1 Municipal Report Form

Each chapter of the municipal report follows a largely uniform structure. One major reason for this is that the commissioners sent the mayor or town clerk of the borough a form letter requesting information on sixteen heads. We list these categories below.

I. The local limits of the Corporation.

II. The Charters by which it is constituted.

III. The Title of the Corporation, a copy of the governing Charter, and the date of all other Charters.

IV. The several Officers of the Corporation, how, and by whom elected, or removed; the time for which they hold their respective offices; their respective Functions and Privileges, and their Salaries and incidental Emoluments.

V. The mode by which persons become Free; their Duties, Privileges and Emoluments; the Number of Resident and Non-resident Freemen.

VI. By whom and from whom the Ruling Body of the Corporation is elected.

VII. Fees paid on admission to the Freedom or any office in the Corporation, and to whom paid.

VIII. Courts, Criminal and Civil; the Officers or Magistrates presiding or otherwise acting in them; the extent of their jurisdiction, whether exclusive or otherwise; the nature of their process; what Fees are paid in them, and to whom; and Tables of Costs.

IX. The Juries, Grand and Petty, Criminal and Civil; by whom, and from whom selected.

X. The management of the Local Police, and general regulation of the town.

XI. The superintendence of the Gaols; by whom exercised, and under what control.

XII. Fines imposed by the Corporation on their own members or others.

XIII. The nature of the Property; the amount of Receipts of the Corporation, from whom derived, by whom received, to what purposes, and by whom applied; how, and to whom accounted for.

XIV. The Patronage, ecclesiastical and other, exercised by the Corporation, through whom dispensed.

XV. A Schedule of the dates and titles of the Local Acts of Parliament relating to Municipal Government, or Local Taxation.

XVI. The general state and prospects of the Town.

C.2 Officer-Task Data

Appendix Table C.1 shows descriptive statistics.

Table C.1: Officer-Task Data

Office	# Boroughs	# Officers	Share Unpaid	Avg Tasks	Most Common Task
Constable	226	1228	0.70	1.13	Law Enforcement
Town clerk	195	204	0.40	3.27	Clerical
Serjeant at mace	187	397	0.23	2.70	Law Enforcement
Recorder	186	224	0.64	1.53	Judicial
Mayor	182	202	0.53	3.20	Judicial
...	...	...	...	...	...
Assessor	2	6	0.17	0.83	Infrastructure
Bridgeman	2	4	1.00	0.50	Financial Corp.
Brother	2	20	1.00	0.30	Governing
Catcher	2	2	0.50	2.00	Clerical
Claviger	2	4	1.00	1.00	Clerical

Note: Table shows descriptive statistics associated with the officer-task data introduced in Section 3. Each row presents one officer. We record the number of boroughs that have the respective officer, the number of officers in our data, the share unpaid, and the average number of tasks as well as the most common task taken on by the officer.

C.3 Borough Data

Appendix Table C.2 shows descriptive statistics.

Table C.2: Borough Data

Variable	Mean	SD	Min	Max
Manorial Lord	0.35	0.48	0.00	1.00
Charter Year	1629.25	95.44	1278.00	1827.00
Area	16283149.55	19641062.66	134817.61	144776160.92
Lay Subsidy Tax (1327)	4.66	7.75	0.00	51.36
Lay Subsidy Tax (1332)	7.13	12.51	0.00	91.76
Lay Subsidy Tax (1334)	9.80	14.68	0.00	100.00
Number of Gentry (1370)	1.09	16.11	0.00	240.00
Market Town (1680)	0.70	0.48	0.00	2.00
Seaport (1680)	0.19	0.42	0.00	2.00
Number of Gentry (1680)	2.42	2.28	0.00	24.00
Number of Baronets (1680)	0.23	0.42	0.00	1.00
Number of Knights (1680)	0.19	0.42	0.00	2.00
Number of MPs (1680)	0.86	1.01	0.00	4.00
Number of Nobility (1680)	0.04	0.21	0.00	2.00
Number of Bishops (1680)	0.02	0.15	0.00	1.00
Longitude	-2.10	1.75	-5.54	1.67
Latitude	52.02	1.15	50.10	55.78
Distance to Coal Field	45670.12	46374.14	0.00	184097.20
Distance to Border	19872.52	22320.24	78.27	86650.92
Distance to London	208433.75	102024.84	16078.60	495034.66
Distance to Market Town	3031.90	4359.76	17.43	25350.39
Distance to River	2102.41	2402.71	1.63	16454.80
Mean Slope	3.13	2.21	0.26	17.77
Wheat Suitability	34.18	14.16	1.86	88.31
Attainable Pasture Yield	0.79	0.06	0.64	0.93
Attainable Wheat Yield	3.23	0.76	0.00	4.12

Note: Table shows descriptive statistics associated with the borough data introduced in Section 3. Each row presents one variable. We record the mean, standard deviation, min, and max of each variable.

C.4 Incentive and Selection Data

Appendix Tables C.3 and C.4 show descriptive statistics of the incentive and selection measures.

Alternative Measures *Prestige.* We measure prestige by whether an office has a refusal penalty associated with it.

Career Concerns. We collect the set of offices that are eligible to be considered for each office, respectively. For some offices, this would be the entire corporation; other offices were only open to a select number of candidates. Thus, we derive, for each office, the number of other offices in the borough that explicitly list said office as a candidate. We apply the inverse hyperbolic sine transformation to this count variable.

Flexibility To measure flexibility, we measure the inverse hyperbolic sine of the count of tasks that an office took on.

Autonomy To measure autonomy, we measure whether an office was subject to approval by the Crown.

Appendix Table C.5 shows results, which are qualitatively aligned with the results in Table 3.

Table C.3: Incentive Data

Variable	Mean	SD	Min	Max
Prestige	0.45	0.32	0	0.99
Career Concerns	0.53	0.50	0	1.00
Flexibility	0.33	0.47	0	1.00
Autonomy	0.52	0.50	0	1.00

Note: Table shows descriptive statistics associated with the officer incentive data introduced in Section 4. Each row presents one variable. We record the mean, standard deviation, min, and max of each variable.

Table C.4: Selection Data

Variable	Mean	SD	Min	Max
Gentleman	0.40	0.49	0	1
Clergy	0.01	0.12	0	1
Corruption	0.07	0.25	0	1
Nepotism	0.05	0.23	0	1

Note: Table shows descriptive statistics associated with the officer selection data introduced in Section 4. Each row presents one variable. We record the mean, standard deviation, min, and max of each variable.

Figure C.1: Prestige and Office Order

Mayor. The Mayor is elected annually on the 8th of September, by the freemen, including the common councilmen, from among the jurats.

He is chief magistrate; presides at the sessions and in the court of record, and is also coroner, by virtue of his office.

On his election he appoints a deputy, who must be one of the jurats.

He has a salary of 2 *l.* 13 *s.* 4 *d.*; a fee of 6 *d.* on sealing writs in the court of record, and, as coroner, a fee of 13 *s.* 4 *d.* on every inquest.

Recorder. The Recorder, or High Steward, is, on a vacancy, chosen for life, by a majority of the whole corporation.

It has always been the custom to elect a barrister.

His duty is to assist the mayor and jurats at the sessions, or other courts in which the mayor and jurats sit in their judicial capacity, and he has always attended the sessions when there have been prisoners to try. He has a salary of 2 *l.* 2 *s.*, and 10 *l.* 10 *s.* for every attendance at sessions.

Town Clerk. The Town Clerk is also appointed for life, by a majority of the whole corporation.

He transacts the law business of the corporation, is clerk of the peace at the sessions, and assists in the court of record.

He has a salary of 2 *l.* a year; his professional charges for business done; a small fee on the admission of freemen; and his fees at the sessions, which are the same as in the county.

Chamberlain. The Chamberlain is elected annually, by a majority of the whole corporation, from among the commoners.

He collects the revenue, and makes the disbursements of the corporation, to whom he accounts annually. He has a salary of 18 *s.* 4 *d.*

Serjeant at Mace. The Serjeant at Mace is, upon a vacancy, appointed during pleasure, by the mayor for the time being.

His duty is to attend the corporation on public occasions, and to serve notices.

He has a salary of 20 *l.*, a livery, and a fee of 1 *s.* on the admission of freemen.

Water-bailiff. The Water-bailiff is appointed during pleasure by the lord of the manor and barony of Folkestone.

His duties are to impannel and summon juries, to act as crier of the courts and keep the gaol.

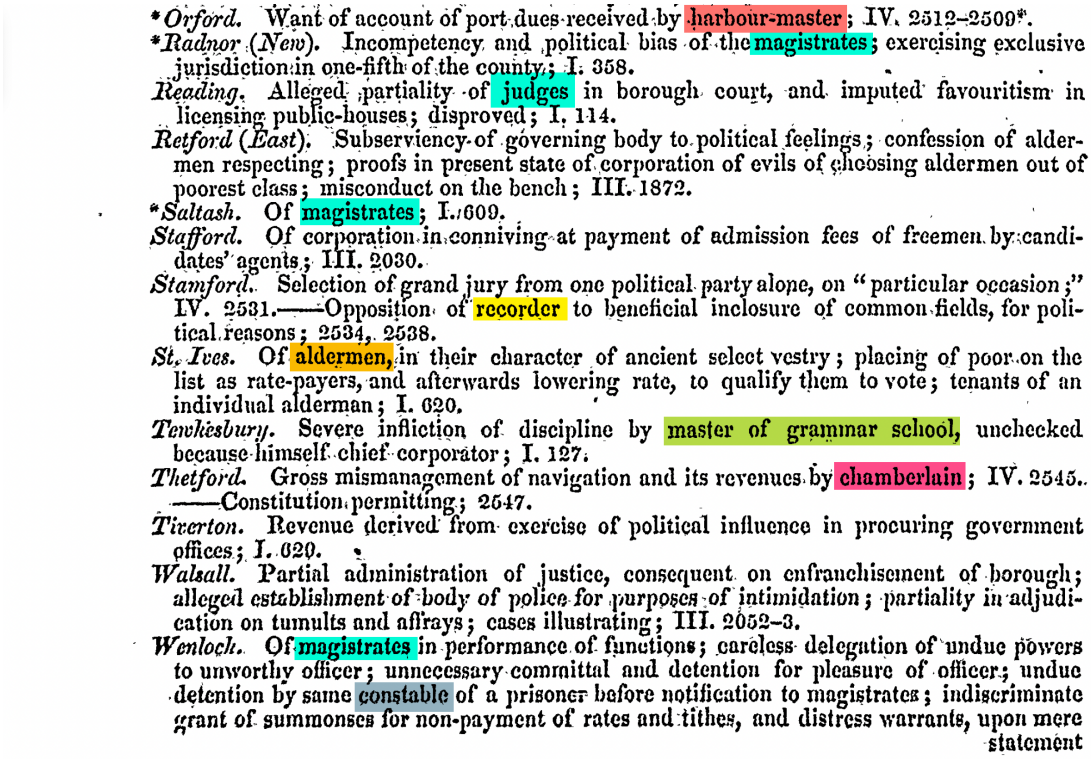
The office is at present filled by the serjeant at mace.

As water-bailiff he has a salary of 5 *l.*; and a house as gaoler. Both from the lord of the manor.

Town Crier. The Town Crier is appointed by the mayor and jurats. His only emoluments are his charges for crying.

Note:

Figure C.2: Officer-Level Corruption



Orford. Want of account of port dues received by harbour-master; IV. 2512–2509*.
*Radnor (New). Incompetency and political bias of the magistrates; exercising exclusive jurisdiction in one-fifth of the county; I. 358.
Reading. Alleged partiality of judges in borough court, and imputed favouritism in licensing public-houses; disproved; I. 114.
Retford (East). Subserviency of governing body to political feelings; confession of aldermen respecting; proofs in present state of corporation of evils of choosing aldermen out of poorest class; misconduct on the bench; III. 1872.
Saltash. Of magistrates; I. 609.
Stafford. Of corporation in conniving at payment of admission fees of freemen by candidates' agents; III. 2030.
Stamford. Selection of grand jury from one political party alone, on "particular occasion;" IV. 2531.——Opposition of recorder to beneficial inclosure of common fields, for political reasons; 2534, 2538.
St. Ives. Of aldermen, in their character of ancient select vestry; placing of poor on the list as rate-payers, and afterwards lowering rate, to qualify them to vote; tenants of an individual alderman; I. 620.
Tewkesbury. Severe infliction of discipline by master of grammar school, unchecked because himself chief corporator; I. 127.
Thetford. Gross mismanagement of navigation and its revenues by chamberlain; IV. 2545.——Constitution permitting; 2547.
Tiverton. Revenue derived from exercise of political influence in procuring government offices; I. 620.
Walsall. Partial administration of justice, consequent on enfranchisement of borough; alleged establishment of body of police for purposes of intimidation; partiality in adjudication on tumults and affrays; cases illustrating; III. 2052–3.
Wenlock. Of magistrates in performance of functions; careless delegation of undue powers to unworthy officer; unnecessary committal and detention for pleasure of officer; undue detention by same constable of a prisoner before notification to magistrates; indiscriminate grant of summonses for non-payment of rates and tithes, and distress warrants, upon mere statement

Note: Distinct offices highlighted in different colors. Corruption category is 'misconduct.'

Table C.5: Officer Incentives (Alternative Measures)

	Job Aspects		Task Aspects	
	Prestige (alt.)	Career Concerns (alt.)	Flexibility (alt.)	Autonomy (alt.)
	(1)	(2)	(3)	(4)
Unpaid	0.05**	0.28***	0.04*	0.02***
	(0.02)	(0.04)	(0.03)	(0.007)
Observations	5,095	5,095	5,095	5,095
R^2	0.59	0.33	0.24	0.31
Boroughs	258	258	258	258
Officers	5,095	5,095	5,095	5,095
Outcome Mean	0.11	0.40	1.06	0.98
Cluster	Borough	Borough	Borough	Borough
Borough fixed effects	✓	✓	✓	✓

Note: Table presents results of estimating equation (1). Observations are at the level of an officer. The number of officers in each sample is indicated in the table. Standard errors are clustered at the borough level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variables are the alternative incentive measures introduced in Appendix Section C.4.

C.5 Task Performance Data

Appendix Table C.6 shows descriptive statistics.

Table C.6: Performance Data

Task	Binary Outcome	Mean	Range	Cutoff
Governance	Overall performance assessment	0.40	[0, 11]	6
Justice	More than two courts held	0.49	[0, 9]	3
Infrastructure	Borough lit or paved	0.49	[0, 2]	1
Clerical Work	Borough keeps accounts	0.57	[0, 1]	1
Financial Management	Borough collects direct 'borough rate'	0.41	[0, 1]	1
Prison	Gaol reported adequate	0.42	[0, 3]	1
Law Enforcement	Police reported adequate	0.31	[0, 3]	2

Note: Table shows descriptive statistics associated with the borough-task performance data introduced in Section 6. Each row presents one task. We record the outcome description, the binarized mean, the raw range, and the cutoff for binarization for each task performance measure.

Governance

The Analytical Index to the municipal report indicates whether boroughs fall under any of 11 categories of governmental malfeasance, enumerated below, along with a short description.

The 11 categories are as follows:

Abuse Boroughs are mentioned under 'abuse' if there is corrupt management of their finances. Common examples include the use of corporation funds for privates purposes or the leasing of town land at low rents to members.

Bribery This category largely concerns bribery surrounding municipal or Parliamentary elections.

Cooping Cooping was the practice of kidnapping eligible voters and (through violence, alcohol, or drugging) inducing them to vote for a certain candidate. This was rare by the time of the municipal report, at least according to the enumerators.

Deficiency Boroughs deemed 'deficient' suffered from some kind of institutional failure, often lacking a sufficiently large police force or qualified candidates for offices.

Family Influence This category concerns families appointing relatives to offices or using their official powers to their advantage.

Incompetency The index describes incompetency as the selection of officers unqualified to serve and the consequences resulting from such appointments.

Misconduct This category is invoked for officers misusing their powers, for instance judges issuing verdicts on personal or political grounds.

Mismanagement Mismanagement generally describes the poor use of corporate property or revenues.

Neglect This category is heterogeneous, but broadly reflects the insufficient performance of town duties, such as clearing the harbor and roads, keeping accounts, or maintaining the prison.

Party Boroughs coded under 'party' were subject to partisanship by officers or the corporation, which often interfered in elections.

Political Patronage This category covers instances in which powerful individuals—often a local lord or gentleman—exercise political influence over the activities of the corporation.

We code a borough as being subject to a governance category if it is mentioned in the corresponding index section

D Performance of the Unpaid State: Details

D.1 Model

Inputs

Denote the task-specific input of officer bo to performance of team bt as α_{bot}. To address our research question, we decompose individual inputs without loss of generality as follows:

$$\alpha_{bot} = \alpha + \gamma \cdot u_{bo} + \varepsilon obt, \tag{6}$$

where α is the expected input of a paid officer, $\alpha + \gamma$ is the expected input of an unpaid officer, and ϵ_{bot} is an officer-team specific component. Our primary parameter of interest is γ, the expected difference in team production inputs between unpaid and paid officers.

Team Production

Following canonical models of team production (Abowd et al., 1999; Bonhomme, 2025), we assume that team output is additively separable in individual officer inputs:

$$Y_{bt} = \lambda_{N_{bt}} \sum_{o=1}^{O_b} \alpha_{bot} \cdot w_{bot} + \varepsilon_{bt}, \tag{7}$$

where Y_{bt} denotes the output of team bt, O_b is the total number of officers in borough b, w_{bot} is an indicator equal to 1 if officer bo is assigned to team bt and 0 otherwise, ε_{bt} captures shocks to team output unrelated to officer inputs, $N_{bt} = \sum_{o=1}^{O_b} w_{bot}$ is the size of team bt, and $\lambda_{N_{bt}}$ is a team-size-dependent scaling factor (normalized so that $\lambda_1 = 1$), which governs returns to scale in team production.

Officer-Level Decomposition

Rewrite equation (7) to isolate the contribution of a single officer bo:

$$
\begin{aligned}
Y_{bt} &= \alpha_{bot} w_{bot} + \sum_{o' \in O_b \setminus o} \alpha_{o'bt} w_{o'bt} + \epsilon_{bt} \\
&= \alpha w_{bot} + \gamma u_{bo} w_{bot} + \underbrace{\epsilon_{bot} w_{bot} + \sum_{o' \in O_b \setminus o} \alpha_{o'bt} w_{o'bt} + \epsilon_{bt}}_{\varepsilon_{bot}} .
\end{aligned} \tag{8}
$$

This decomposition holds for every officer bo.
Our baseline approach makes two choices:

- We focus on individual officers bo (Appendix Section D.2 presents robustness checks).
- We assume constant returns to scale in team size (Appendix Section D.3 presents robustness checks).

Descriptive Regression

In Section 6.2, we compare the team performance of paid and unpaid officers. Our estimating equation comes out of the model as follows: We average equation (8) across all teams to which officer bo is assigned (i.e., those with $w_{bot} = 1$). This yields:

$$
\frac{1}{\sum_{t=1}^{T} w_{bot}} \sum_{t=1}^{T} Y_{bt} w_{bot} = \alpha + \gamma u_{bo} + \underbrace{\frac{1}{\sum_{t=1}^{T} w_{bot}} \sum_{t=1}^{T} w_{bot} \varepsilon_{bot}}_{\varepsilon_{bo}} . \tag{9}
$$

An OLS estimate of γ based on this equation compares mean team performance across paid and unpaid officers.

D.2 Team Production: Spillovers

Clustering Because team performance may be correlated within boroughs, we assess the robustness of our results to alternative clustering choices. Appendix Table D.1 reports results from estimating equation (4) with standard errors clustered at various higher aggregation levels. Across all specifications, our main findings remain statistically robust.

Relative Performance To limit the scope for cross-team spillovers biasing our results, we construct four additional variables:

1. Team performance relative to the leave-out mean of other teams in the borough,
2. team performance relative to the leave-out max of other teams in the borough,
3. a binary indicator of whether team performance exceeds the leave-out mean of other teams in the borough, and
4. a binary indicator of whether team performance exceeds the leave-out max of other teams in the borough.

Note that 4) is especially restrictive: this variable is zero except when a team performs well and no other team in the borough does.
Appendix Tables D.2, D.3, D.4, and D.5 show results from estimating equation (4) using 1)-4) as an outcome variable. Our findings qualitatively hold up across these increasingly restrictive outcome variables.

Subsets To limit the score for within-team spillovers, we restrict our sample to borough-tasks with just one officer. Appendix Table (D.6) shows results.

Aggregation We next assess the robustness of our findings to aggregating to the team level, to abstract from within-team spillovers. Under the assumption of constant returns to scale ($\lambda_{N_{bt}} = 1$ for all N_{bt}), we can rewrite equation (7) as follows:

$$
\begin{aligned}
Y_{bt} &= \sum_{o=1}^{O_b} \alpha_{bot} w_{bot} u_{bo} + \sum_{o=1}^{O_b} \alpha_{bot} w_{bot} (1 - u_{bo}) + \epsilon_{bt} \\
&= \sum_{o \in \mathcal{U}_{bt}} \alpha_{bot} + \sum_{o \in \mathcal{S}_{bt}} \alpha_{bot} + \epsilon_{bt} \\
&= \sum_{o \in \mathcal{U}_{bt}} (\alpha + \gamma + \epsilon_{bot}) + \sum_{o \in \mathcal{S}_{bt}} (\alpha + \epsilon_{bot}) + \epsilon_{bt} \\
&= (\alpha + \gamma) U_{bt} + \alpha S_{bt} + \underbrace{\sum_{o \in \mathcal{U}_{bt} \cup \mathcal{S}_{bt}} \epsilon_{bot} + \epsilon_{bt}}_{\varepsilon_{bt}} \\
&= \gamma U_{bt} + \alpha N_{bt} + \varepsilon_{bt} \qquad (10) \\
& \qquad (11)
\end{aligned}
$$

where $\mathcal{U}_{bt}$ and $\mathcal{S}_{bt}$ are the unpaid and paid officers on bt. U_{bt} and S_{bt} are the corresponding set sizes (so $N_{bt} = U_{bt} + S_{bt} = |\mathcal{U}_{bt}| + |\mathcal{S}_{bt}|$).

Equation (10) motivates a team-level empirical specification in which we estimate γ by regressing team performance on the number of unpaid officers, controlling for overall team size. Specifically, we estimate:

$$
Y_{bt} = bU_{bt} + aN_{bt} + X_b \, \mathbb{1}(\tau = t)'\theta + \delta_b + \delta_t + \delta_{ct} + e_{bt}, \qquad (12)
$$

where all variables are as defined above, and δ_{ct} are county-by-task fixed effects. Standard errors are clustered at the borough level.

Appendix Table D.7 presents the results. The coefficient on U_{bt} is positive and statistically significant, indicating that a greater number of unpaid officers is associated with higher team performance, even after accounting for total team size and fixed effects.

To account for potential spillovers *between* teams, we aggregate our data to the borough level. We thus estimate

$$
Y_b = bU_b + aN_b + X_b + \delta_c + e_b, \qquad (13)
$$

with Y_b the mean performance of the borough across tasks and all other variables as borough-level aggregates of the variables in equation (12). Appendix Table D.8 shows results, which again qualitatively

affirm the association between unpaid status and performance.

Table D.1: Unpaid and Performance (Standard Errors)

	Performance						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Unpaid Officer on Team	0.18***	0.18***	0.18***	0.18***	0.18***	0.18***	0.18***
	(0.03)	(0.03)	(0.04)	(0.03)	(0.04)	(0.06)	(0.05)
Standard-Errors	Borough × Task	Task Scope	Borough	County	50km	100km	200km
Observations	35,665	35,665	35,665	35,665	35,665	35,665	35,665
R^2	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Outcome Mean	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Borough fixed effects	✓	✓	✓	✓	✓	✓	✓
Task fixed effects	✓	✓	✓	✓	✓	✓	✓
Task Scope fixed effects	✓	✓	✓	✓	✓	✓	✓

Note: Table presents results of estimating equation (4), using varying standard errors as indicated in the table. Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, as introduced in Section 6.

Table D.2: Unpaid and Relative Performance (Leave-Out Mean)

	Relative Performance (Leave-Out Mean)		
	(1)	(2)	(3)
Unpaid Officer on Team	0.16***	0.17***	0.21***
	(0.03)	(0.03)	(0.03)
Observations	35,665	35,665	35,665
R^2	0.07	0.15	0.15
Boroughs	258	258	258
Officers	5,095	5,095	5,095
Tasks	7	7	7
Outcome Mean	0.00	0.00	0.00
Cluster	Borough × Task	Borough × Task	Borough × Task
Task Control	✓	✓	✓
Controls		✓	✓
Borough fixed effects	✓	✓	✓
Task fixed effects	✓	✓	✓
Task Scope fixed effects			✓

Note: Table presents results of estimating equation (4). Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, subtracting the leave-out mean of borough-task performance in the respective borough.

Table D.3: Unpaid and Relative Performance (Leave-Out Max)

	Relative Performance (Leave-Out Max)		
	(1)	(2)	(3)
Unpaid Officer on Team	0.14***	0.16***	0.20***
	(0.03)	(0.02)	(0.03)
Observations	35,665	35,665	35,665
R^2	0.22	0.29	0.29
Boroughs	258	258	258
Officers	5,095	5,095	5,095
Tasks	7	7	7
Outcome Mean	-0.40	-0.40	-0.40
Cluster	Borough × Task	Borough × Task	Borough × Task
Task Control	✓	✓	✓
Controls		✓	✓
Borough fixed effects	✓	✓	✓
Task fixed effects	✓	✓	✓
Task Scope fixed effects			✓

Note: Table presents results of estimating equation (4). Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, subtracting the leave-out max of borough-task performance in the respective borough.

Table D.4: Unpaid and Outperformance (Leave-Out Mean)

	Outperform Leave-Out Mean		
	(1)	(2)	(3)
Unpaid Officer on Team	0.13***	0.15***	0.18***
	(0.02)	(0.02)	(0.03)
Observations	35,665	35,665	35,665
R^2	0.27	0.33	0.33
Boroughs	258	258	258
Officers	5,095	5,095	5,095
Tasks	7	7	7
Outcome Mean	0.55	0.55	0.55
Cluster	Borough × Task	Borough × Task	Borough × Task
Task Control	✓	✓	✓
Controls		✓	✓
Borough fixed effects	✓	✓	✓
Task fixed effects	✓	✓	✓
Task Scope fixed effects			✓

Note: Table presents results of estimating equation (4). Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is a binary indicator of whether borough-task performance exceeds the leave-out mean of borough-task performance in the respective borough.

Table D.5: Unpaid and Outperformance (Leave-Out Max)

	Outperform Leave-Out Max		
	(1)	(2)	(3)
Unpaid Officer on Team	0.01**	0.01**	0.01**
	(0.005)	(0.005)	(0.006)
Observations	35,665	35,665	35,665
R^2	0.15	0.16	0.16
Boroughs	258	258	258
Officers	5,095	5,095	5,095
Tasks	7	7	7
Outcome Mean	0.01	0.01	0.01
Cluster	Borough × Task	Borough × Task	Borough × Task
Task Control	✓	✓	✓
Controls		✓	✓
Borough fixed effects	✓	✓	✓
Task fixed effects	✓	✓	✓
Task Scope fixed effects			✓

Note: Table presents results of estimating equation (4). Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is a binary indicator of whether borough-task performance exceeds the leave-out max of borough-task performance in the respective borough.

Table D.6: Unpaid and Performance (Single-Officer Teams)

	Performance		
	(1)	(2)	(3)
Unpaid Officer on Team	0.15***	0.13***	0.19***
	(0.03)	(0.03)	(0.05)
Observations	14,198	14,198	14,198
R^2	0.43	0.51	0.51
Boroughs	249	249	249
Officers	4,703	4,703	4,703
Tasks	7	7	7
Outcome Mean	0.52	0.52	0.52
Cluster	Borough × Task	Borough × Task	Borough × Task
Task Control	✓	✓	✓
Controls		✓	✓
Borough fixed effects	✓	✓	✓
Task fixed effects	✓	✓	✓
Task Scope fixed effects			✓

Note: Table presents results of estimating equation (4), restricting the sample to single-officer teams. Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, as introduced in Section 6..

Table D.7: Unpaid and Performance (Team Level)

	Performance		
	(1)	(2)	(3)
Unpaid Officers (Const. Returns)	0.01***	0.02***	0.02***
	(0.005)	(0.005)	(0.006)
Observations	1,939	1,939	1,939
R^2	0.29	0.35	0.52
Boroughs	277	277	277
Tasks	7	7	7
Outcome Mean	0.49	0.49	0.49
Cluster	Borough	Borough	Borough
Controls		✓	✓
Borough fixed effects	✓	✓	✓
Task fixed effects	✓	✓	✓
County × Task fixed effects			✓

Note: Table presents results of estimating equation (12). Observations are at the level of a borough-task. The number of borough-tasks and boroughs in each sample is indicated in the table. Standard errors are clustered at the borough level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, as introduced in Section 6.

Table D.8: Unpaid and Performance (Borough Level)

	Performance		
	(1)	(2)	(3)
Unpaid Officers	0.02***	0.02***	0.02**
	(0.008)	(0.008)	(0.008)
Observations	277	277	277
R^2	0.39	0.58	0.62
Boroughs	277	277	277
Outcome Mean	0.49	0.49	0.49
Cluster	County	County	County
Controls			✓
County fixed effects		✓	✓

Note: Table presents results of estimating equation (13). Observations are at the level of a borough. The number of boroughs in each sample is indicated in the table. Standard errors are clustered at the county level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is the mean performance across all tasks in a borough, as introduced in Section 6.

D.3 Team Production: Returns to Team Size

Estimating Returns One choice in estimation is the parameter that governs returns to team size $\lambda_{N_{bt}}$. Our main approach uses constant returns to team size. To estimate returns to team size, we rely on a two-step procedure, rooted in a canonical 'movers' design Abowd et al., 1999. Drawing on the algorithms proposed in Bonhomme (2025), we proceed as follows:

1. Identify the largest connected set of cross-team movers in our data.
2. Estimate returns to team size using data on team production and team size.

Note that this approach relies on observing individuals across teams. Given the limitations of our historical data, these estimates are naturally more noisy than estimates of large datasets with frequent observations of individuals across different teams. Step 1) also reduces our data so that we can only estimate ($\lambda = (\lambda_1, \lambda_2, \lambda_3) = (1, 0.79, 0.58)$).

Estimated Returns to Team Size We can then utilize these estimated returns, by revisiting equation (7) and allowing for non-constant returns:

$$Y_{bt} = \lambda_{N_{bt}} \sum_{o=1}^{O_b} \alpha_{bot} w_{bot} + \epsilon_{bt} \qquad = \alpha, \lambda_{N_{bt}} w_{bot} + \gamma, \lambda_{N_{bt}} u_{bo} w_{bot} + \tilde{\varepsilon}_{bot},$$

Appendix Table D.9 shows results when using estimated returns to team size (and omitting all teams with a team size larger than three). Results are qualitatively unchanged.

Plausible Returns to Team Size To assess the robustness of our results across all team sizes and all plausible returns to team size, we evaluate a family of functions for $\lambda_{N_{bt}}$ of the form:

$$\lambda(N_{bt}) = \zeta + (1 - \zeta)\frac{1}{N_{bt}}, \tag{14}$$

where $\zeta \in [0, 1]$. This specification interpolates between constant returns to scale ($\zeta = 1$) and a setting where the marginal contribution of each team member decreases inversely with team size ($\zeta = 0$).
Appendix Figure D.1 plots the resulting values of $\lambda_{N_{bt}}$ against observed team sizes, which range from 1 to 51. We consider $\zeta \in [0, 1]$ in step sizes of $\frac{1}{1000}$.

We then re-estimate regression equation (4), scaling both w_{bot} and $w_{bot}u_{bo}$ by the corresponding $\lambda_{N_{bt}}$. Across the full range of $\lambda_{N_{bt}}$ values considered, the estimated coefficient $\hat{b}$ remains positive, indicating a robust positive relationship between unpaid status and team output.

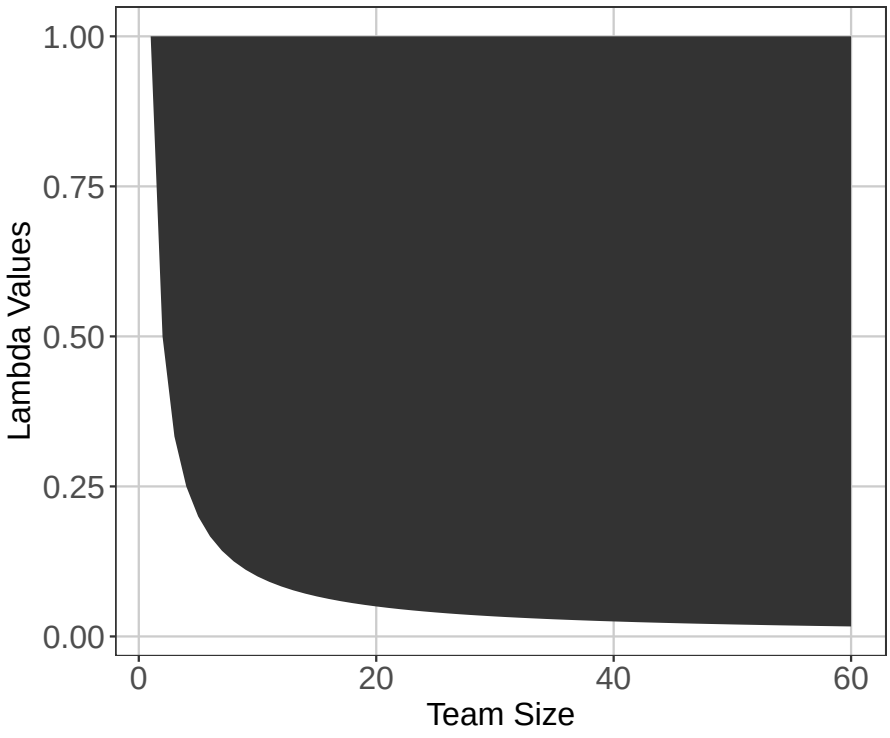
Estimating Paid-Unpaid Differences In Inputs Finally, we can apply the methodology from (Bonhomme, 2025) to assess whether our general findings also hold up in a sample of estimated *individual* team inputs. Note that relying on the 'connected set' reduces our sample to 447 officers.[1]
We proceed in two steps:

1. We estimate individual officer productivity inputs $\hat{\alpha}_{bo}$.

2. We then regress the estimated inputs $\hat{\alpha}_{bo}$ on the paid status of each officer u_{bo}.

We thus test for statistically significant differences in individual inputs between unpaid and paid officers. Appendix Table D.10 reports the results of Step 2, both with and without the inclusion of borough fixed effects. Among unpaid officers, estimated inputs are significantly higher than among paid officers.

Figure D.1: Simulated Values of $\lambda_{N_{bt}}$ across Team Sizes



Note: The figure displays the values of $\lambda_{N_{bt}}$ used in our robustness analysis, as a function of team size N_{bt}, for selected values of ζ. Team sizes range from 1 to 51.

[1] As outlined in equation (6), our parameter of interest relies on the mean of the distribution of individual inputs, and does not require characterizing the full distribution of individual inputs. Hence, our main analyses use the entire sample.

Table D.9: Unpaid and Performance (Estimated Returns)

	Performance		
	(1)	(2)	(3)
Unpaid Officer on Team	0.15***	0.13***	0.18***
	(0.03)	(0.03)	(0.04)
Observations	21,470	21,470	21,470
R^2	0.35	0.41	0.41
Boroughs	257	257	257
Officers	5,029	5,029	5,029
Tasks	7	7	7
Outcome Mean	0.57	0.57	0.57
Cluster	Borough × Task	Borough × Task	Borough × Task
Task Control	✓	✓	✓
Controls		✓	✓
Borough fixed effects	✓	✓	✓
Task fixed effects	✓	✓	✓
Task Scope fixed effects			✓

Note Note: Table presents results of estimating equation (4), using estimated returns to team size as described in Appendix Section D.3. Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, as introduced in Section 6..

Table D.10: Unpaid and Estimated Inputs (Team Level, Bonhomme, 2025)

	Officer Ability		
	(1)	(2)	(3)
Unpaid	0.19***	0.20***	0.23***
	(0.04)	(0.04)	(0.08)
Observations	446	446	446
R^2	0.04	0.06	0.40
Boroughs	222	222	222
Outcome Mean	0.08	0.08	0.08
Cluster	Borough	Borough	Borough
Controls		✓	✓
Borough fixed effects			✓

Note: Table presents results from regressing estimated team performance inputs using Bonhomme (2025) on unpaid status in a regression using borough fixed effects. Observations are at the level of an officer. The number of officers in each sample is indicated in the table. Standard errors are clustered at the borough level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, as introduced in Section 6..

D.4 Comparable Control Groups

Fixed Effects The inclusion of fixed effects in equation (4) implies a set of within-transformations that remove variation at different levels of aggregation. These transformations help isolate variation that is orthogonal to systematic differences across boroughs, tasks, and officer assignment patterns. Below, we highlight the terms subtracted from the main variables in equation (4) as a consequence of the specific fixed effect.

- **Borough Fixed Effects** (δ_b)
  - Y_{bt}:
    $$\frac{1}{O_b \cdot T} \sum_{o=1}^{O_b} \sum_{t=1}^{T} Y_{bt} = \frac{1}{T} \sum_{t=1}^{T} Y_{bt}$$
    Captures borough-level productivity differences across tasks (i.e., 'some boroughs do better than others').
  - w_{bot}:
    $$\frac{1}{O_b \cdot T} \sum_{o=1}^{O_b} \sum_{t=1}^{T} w_{bot}$$
    Captures borough-level variation in staffing intensity (i.e., 'some boroughs have more officers' or 'some officers cover more tasks').
  - $w_{bot}u_{bo}$:
    $$\frac{1}{O_b \cdot T} \sum_{o=1}^{O_b} \sum_{t=1}^{T} u_{bo} w_{bot}$$
    Captures borough-level variation in unpaid staffing (i.e., 'some boroughs have more unpaid officers' or 'some boroughs assign them to more tasks').
- **Task Fixed Effects** (δ_t)
  - Y_{bt}:
    $$\frac{1}{B \cdot O_b} \sum_{b=1}^{B} \sum_{o=1}^{O_b} Y_{bt} = \frac{1}{B} \sum_{b=1}^{B} Y_{bt}$$
    Captures task-specific difficulty (i.e., 'some tasks are easier').
  - w_{bot}:
    $$\frac{1}{B \cdot O_b} \sum_{b=1}^{B} \sum_{o=1}^{O_b} w_{bot}$$
    Captures task implementation and staffing (i.e., 'some tasks are more common across boroughs' or 'some tasks have larger teams').

- $w_{bot}u_{bo}$:

$$\frac{1}{B \cdot O_b} \sum_{b=1}^{B} \sum_{o=1}^{O_b} u_{bo} w_{bot}$$

Captures unpaid staffing across tasks (i.e. 'some tasks are more often staffed with unpaid officers' or 'unpaid teams are larger in certain tasks').

- **Task Scope Fixed Effects** (δ_s)

  - Y_{bt}:

$$\frac{1}{T} \sum_{t=1}^{T} Y_{bt}$$

Same as for borough fixed effects δ_b: Captures borough-level productivity differences across tasks (i.e., 'some boroughs do better than others').

  - w_{bot}:

$$\frac{1}{T} \sum_{t=1}^{T} w_{bot}$$

Measures the scope of an officer's task assignments (i.e. 'this officer covers more tasks').

  - $w_{bot}u_{bo}$:

$$\frac{1}{T} \sum_{t=1}^{T} u_{bo} w_{bot}$$

Measures the breadth of unpaid assignments (i.e. 'this unpaid officer is assigned to more tasks').

In addition, we can vary the set of fixed effects included in the regression specification. Appendix Table D.11 presents results from a specification that includes county-by-task fixed effects. The estimated correlation with unpaid status remains stable, indicating that our main findings are not sensitive to task-specific confounders that vary at the county level.

Controls Appendix Table D.12 reports results from equation (4), including officer-level controls. Specifically, we interact team assignment (w_{bot}) with indicator variables capturing whether an officer is a magistrate, a member of the governing body or the common council, a Justice of the Peace, or subject to Crown approval. Across all specifications, our main coefficient of interest remains stable and comparable to the baseline estimates. Moreover, the additional controls are not significantly associated with team performance, suggesting that these observed characteristics do not confound the main relationship.

Matching To more comprehensively account for potential differences at the borough and officer levels, we implement a propensity score matching approach. Specifically, we estimate a Probit model to predict an officer's unpaid status using the full set of borough and officer characteristics. Based on the estimated propensity scores, we use a nearest neighbor matching algorithm to pair each unpaid officer with the most similar paid counterpart. We then re-estimate regression equation (4) on this matched sample. Results, reported in Appendix Table D.13, are qualitatively consistent with our main specification, indicating that the observed relationship is not driven by systematic differences in observables.

Outliers Next, we assess whether our results are driven by specific tasks. Appendix Figure D.2 presents estimates from regression equation (4), sequentially omitting one task at a time from the sample. Across all leave-one-out specifications, the estimated effect of unpaid status remains statistically significant and qualitatively consistent with our main findings, suggesting that no single task is disproportionately influencing the results.

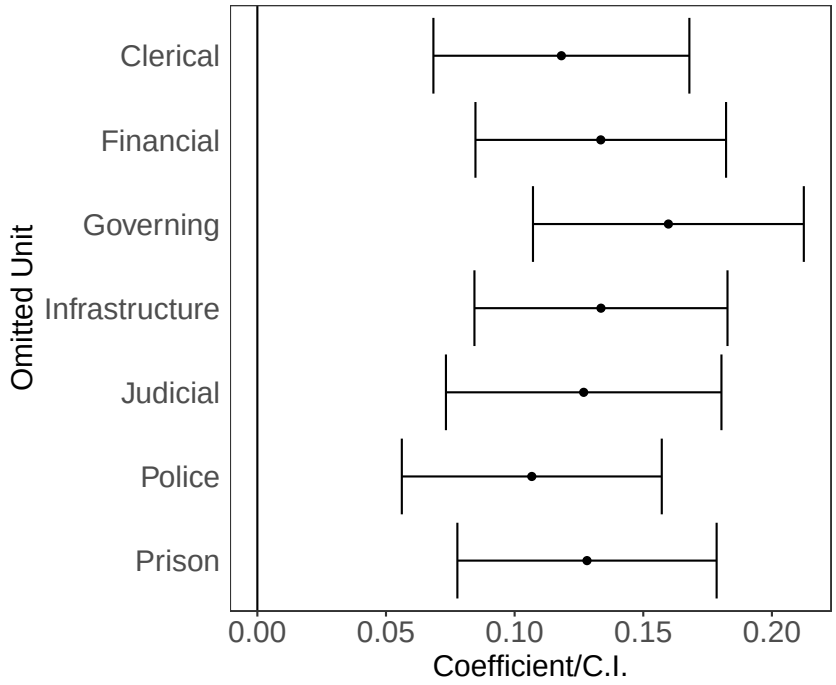
We also assess robustness to the binarization of task performance. Our main measure introduced in Section 6.1 binarizes each ordinal or count measure at the median. Instead, we consider alternative thresholds in a neighborhood of the median: for example, the cutoff for 'number of courts held' is three. We then consider cutoffs in $(2, 3, 4)$. We apply this neighborhood cutoff rule to all performance measures. Then, we choose a random draw from the cross-product of all possible cutoff rules and re-estimate regression equation (4). Appendix Table D.3 shows results: Throughout all permutations, coefficients remain significant and positive.

Table D.11: Unpaid and Performance (Fixed Effects)

	Performance		
	(1)	(2)	(3)
Unpaid Officer on Team	0.15***	0.18***	0.13***
	(0.02)	(0.03)	(0.02)
Observations	35,665	35,665	35,665
R^2	0.31	0.32	0.53
Outcome Mean	0.59	0.59	0.59
Controls	✓	✓	✓
Cluster	Borough × Task	Borough × Task	Borough × Task
Borough fixed effects	✓		
Task fixed effects	✓	✓	
Task Scope fixed effects		✓	✓
County × Task fixed effects			✓

Note: Table presents results of estimating equation (4), using restrictive fixed effects as indicated in the table. Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, as introduced in Section 6..

Figure D.2: Unpaid and Performance (Leave-Out)



Note Note: Figure presents results of estimating equation (4), leaving out one task at a time. Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, as introduced in Section 6..

Table D.12: Unpaid and Performance (Officer Characteristics)

	Performance		
	(1)	(2)	(3)
Unpaid Officer on Team	0.13***	0.15***	0.18***
	(0.02)	(0.02)	(0.03)
Magistrate × On Task	0.02	0.02	0.02
	(0.04)	(0.04)	(0.05)
Part of Governing Body × On Task	-0.001	0.009	0.007
	(0.05)	(0.05)	(0.05)
Part of Common Council × On Task	0.02	0.02	0.02
	(0.05)	(0.05)	(0.06)
Justice of the Peace × On Task	0.007	0.002	-0.0001
	(0.04)	(0.04)	(0.05)
Approval by Crown × On Task	0.04	-0.010	-0.008
	(0.06)	(0.06)	(0.06)
Observations	35,665	35,665	35,665
R^2	0.25	0.31	0.32
Boroughs	258	258	258
Officers	5,095	5,095	5,095
Tasks	7	7	7
Outcome Mean	0.59	0.59	0.59
Cluster	Borough × Task	Borough × Task	Borough × Task
Task Control	✓	✓	✓
Controls		✓	✓
Borough fixed effects	✓	✓	✓
Task fixed effects	✓	✓	✓
Task Scope fixed effects			✓

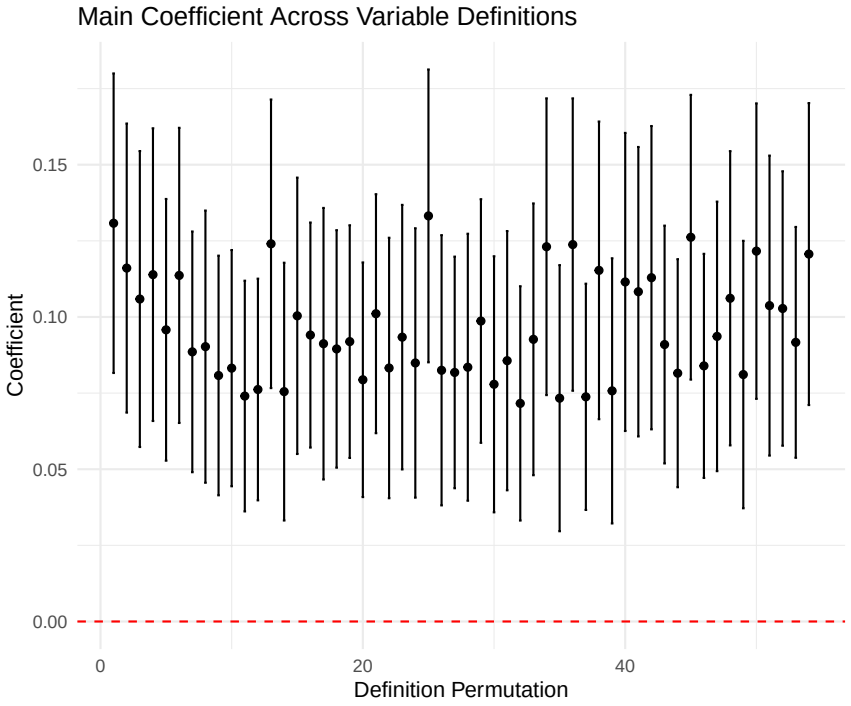
Note: Table presents results of estimating equation (4), controlling for officer characteristics as indicated in the table. Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, as introduced in Section 6..

Table D.13: Unpaid and Performance (Matching)

	Performance		
	(1)	(2)	(3)
Unpaid Officer on Team	0.17***	0.18***	0.20***
	(0.03)	(0.03)	(0.04)
Observations	24,234	24,234	24,234
R^2	0.25	0.32	0.32
Boroughs	243	243	243
Officers	3,462	3,462	3,462
Tasks	7	7	7
Outcome Mean	0.59	0.59	0.59
Cluster	Borough × Task	Borough × Task	Borough × Task
Task Control	✓	✓	✓
Controls		✓	✓
Borough fixed effects	✓	✓	✓
Task fixed effects	✓	✓	✓
Task Scope fixed effects			✓

Note: Table presents results of estimating equation (4), in a matched sample. Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, as introduced in Section 6..

Figure D.3: Unpaid and Performance (Binarization Variation)



Note: Figure presents results of estimating equation (4), varying the cutoffs for borough-task performance binarization as detailed in Appendix Section D. Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, as introduced in Section 6..

D.5 Unaffordability

Exclusion One concern is that the idiosyncratic component of borough income directly impacts borough performance. This concern is especially relevant for financial tasks: high rental income might ease requirements on the level of borough taxation, making it easier to collect such a tax, or it might increase fiscal capacity directly. Appendix Table D.14 shows that results are robust when omitting financial tasks from the estimation.

Substitution Another concern involves substitution along the extensive margin — such as boroughs reallocating tasks across officers or reducing the number of officers — which could affect team assignment, w_{bot}. To address this concern, we use institutional constraints embedded in borough charters, which mandated the presence of specific officers. We subset our data to just officers that were specified in the charter, and just to the modal task of each officers. We repeat the construction of (expected) unaffordability using charter officers and modal tasks. Appendix Table D.15 shows that results are robust to using this pre-determined set of officers.

Table D.14: Unaffordable and Performance (Task Subset)

	Performance		
	(1)	(2)	(3)
Unaffordable Officer on Team	0.09**	0.10***	0.11**
	(0.04)	(0.03)	(0.05)
Observations	30,570	30,570	30,570
R^2	0.28	0.33	0.33
Boroughs	258	258	258
Officers	5,095	5,095	5,095
Tasks	6	6	6
Outcome Mean	0.60	0.60	0.60
Cluster	Borough × Task	Borough × Task	Borough × Task
Task Control	✓	✓	✓
Controls		✓	✓
Borough fixed effects	✓	✓	✓
Task fixed effects	✓	✓	✓
Task Scope fixed effects			✓

Note: Table presents results of estimating equation (4), replacing observed unpaid status u_{bo} with predicted unaffordability v_{bo} and controlling for expected unaffordability $\bar{v}_{bo}$, and restricting the sample to non-financial tasks. Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, as introduced in Section 6..

Table D.15: Unaffordable and Performance (Charter Officers)

	Performance		
	(1)	(2)	(3)
Unaffordable Charter Officer on Team	0.31***	0.28***	0.30***
	(0.07)	(0.07)	(0.08)
Observations	10,311	10,311	10,311
R^2	0.30	0.38	0.39
Boroughs	137	137	137
Officers	1,473	1,473	1,473
Tasks	7	7	7
Outcome Mean	0.61	0.61	0.61
Cluster	Borough × Task	Borough × Task	Borough × Task
Task Control	✓	✓	✓
Controls		✓	✓
Borough fixed effects	✓	✓	✓
Task fixed effects	✓	✓	✓
Task Scope fixed effects			✓

Note: Table presents results of estimating equation (4), replacing observed unpaid status u_{bo} with predicted unaffordability v_{bo} and controlling for expected unaffordability $\bar{v}_{bo}$, and restricting the sample to charter officers. Observations are at the level of an officer-task. The number of officer-tasks and officers in each sample is indicated in the table. Standard errors are clustered at the borough-task level. *, **, and *** denote significance on the 10 percent, 5 percent, and 1 percent level, respectively. The dependent variable is borough-task performance, as introduced in Section 6..

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