

# Property Rights and Parliament in Industrializing Britain.

During Britain's industrialization, Parliament operated a forum where rights to land and resources could be reorganized. This venue enabled landholders and communities to exploit economic opportunities that could not be accommodated by the inflexible rights regime inherited from the past. In this essay, historical evidence, archival data, and statistical analysis demonstrate that Parliament increased the number of acts reorganizing property rights in response to increases in the demand for such acts. Tests with placebo groups confirm the robustness of this result. This evidence indicates that Parliament responded elastically to changes in the public's demand for reorganizing property rights.

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*... laws and institutions must go hand in hand with the progress of the human mind. As that becomes more developed, more enlightened, as new discoveries are made, new truths discovered and manners and opinions change, with the change of circumstances, institutions must advance also to keep pace with the times. We might as well require a man to wear still the coat which fitted him when a boy as civilized society to remain ever under the regimen of their barbarous ancestors.*

*Thomas Jefferson*<sup>1</sup>

## **1. Introduction**

Ronald Coase's seminal articles, "The Problem of Social Cost (1960)" and "The Lighthouse in Economics (1974)," examine property rights in nineteenth-century Britain. The British system, Coase contends, was flexible and efficient, a contention illustrated with examples from the common law of industrial torts and Parliament's policies towards lighthouses. When and how this system arose remains unclear. Understanding its origins is, according to Hernando de Soto, a key task of economic history (de Soto 2000). Recent research examines related issues, such as the increasing accessibility of Britain's government preceding industrialization and the Enlightenment's impact on economic behavior and institutions (North, Wallis, and Weingast 2009; Mokyr 2002, 2009). Recent research regarding the evolution of property rights focuses on frontiers of settlement, such as the western United States during the nineteenth century and the Brazilian Amazon during recent decades (Libecap 1989, Alston, Libecap, and Mueller 1999, Anderson and Hill 1975). This line of research emphasizes the public's demand and the political system's supply of property rights. Little work has been done, however, to explain the demand and supply of innovations in property-rights during Britain's industrialization. Concerning this critical issue, our essay asks: did Parliament supply property-rights innovations elastically, in the sense that when the public's demand for legislation reorganizing property rights expanded, the

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<sup>1</sup> Thomas Jefferson's letter to Samuel Kercheval, July 12, 1816. This quote is inscribed on the south-eastern interior wall of the Jefferson Memorial in Washington, DC.

quantity of legislation rose in response, while the cost remained reasonable and stable? Or, did Parliament supply legislation inelastically, indicating that the political system dictated the pace of reform, perhaps due to the desire to restrain change, extract economic rents, or protect social classes?

Addressing these questions entails understanding property-rights in pre-industrial Britain and Parliament's role in modifying the system. Britain's pre-industrial property-rights system posed problems for people trying to reallocate resources towards more productive uses, particularly opportunities arising from technologies unanticipated in the distant past. Holders of equitable estates could neither mortgage, nor lease, nor sell much of the land under their control. Holders under many types of tenures could only transfer property to particular persons or members of a local community. Residents in common field villages often had to keep land in traditional uses. Residents could neither utilize resources in new ways, nor improve infrastructure, nor repackage rights without reaching agreements with all other parties possessing interests in a parcel, and such agreements could not, in most cases, be enforced by law, but could, in many instances, be challenged through courts.

Britain's pre-industrial property-rights system also inhibited localities from providing public goods, particularly those extending beyond the bounds of traditional communities or those necessitated by the expansion of commerce and cities. Communities lacked mechanisms for raising revenues and powers of eminent domain. Communities struggled to overcome free-riding, which inhibited the provision of public goods, and hold-outs, who withheld resources needed for public projects unless paid exorbitant sums. Market transactions might have alleviated these inefficiencies, but in most cases, the necessary transfers could not be consummated and the requisite contracts could not be enforced because of the restrictive nature

of the anachronistic rights regime, which valued tradition and stability above innovation and flexibility.

These problems persisted until Parliament embraced novel ideas concerning property and established procedures for processing petitions from groups hoping to reorganize rights to land and resources. These procedures enabled Parliament to review requests from individuals, families, and communities, and after considering the interests of all concerned and the general public, rewrite rules regarding the use of land and resources. Parliament enshrined these accords in three types of acts: estate, statutory authority, and enclosure. *Estate acts* altered the rights of individuals and families; eliminated restrictions on the uses to which property could be put; authorized the sale, mortgage, and leasing of land; and facilitated the enforcement of contracts. Acts establishing *statutory authorities* created new organizations that built, operated, and maintained infrastructure and public services. Statutory authorities received new rights, such as the authority to collect tolls, levy taxes, issue debt, and purchase land. These rights superseded traditional rights, such as burgesses' right to travel throughout the realm free from tax and toll, enshrined for centuries in town charters and the Magna Carta. *Enclosure acts* disbanded collectively-managed common-field villages and assigned to individuals rights to particular pieces of property. Enclosure acts also shifted commonly-held agricultural land to new uses, such as the construction of housing and workshops near growing towns and cities. Acts of all three types embodied the public's desire to reorganize rights and to reallocate resources towards more productive uses.

This essay shows that Parliament's supply of property-rights innovations was elastic. Our method begins with simple assumptions about the way in which Parliament and the political process operated, or in other words, the processes through which people proposed and

Parliament passed acts. These assumptions yield a simple, structural model of the Parliamentary process, which in turn, yields a series of reduced-form equations that can be estimated to identify whether Parliament responded to changes in the public's demand for estate, enclosure, and statutory-authority acts. This method enables us to account for econometric issues – such as the non-stationarity and heterogeneity of the statistical series – that complicate the process of drawing inferences from the data. This method also enable us to eliminate plausible alternative explanations for the patterns apparent in the evidence, and thus, to draw causal conclusions from the correlations in the data.

The rest of this essay carries out this endeavor. Section 2 describes the consensus emerging among scholars about politics in industrializing Britain and explains the novelty of our arguments in this venerable but vibrant literature. Section 3 describes the archival data that we employ and the new data that we analyze. Section 4 introduces our mathematical model and statistical methods. Section 5 describes our empirical results.

Our principal finding is the correlation between changes in economic conditions and the passage of acts reorganizing property rights. Fewer acts were passed when economic conditions lowered returns from reorganizing rights. More acts were passed when economic conditions increased returns from reorganizing rights. Interest rates and international trade were particularly important. Lower interest rates reduced the cost of financing construction. Trade booms raised returns from investing in infrastructure. This finding demonstrates that Parliament supplied legislation for reorganizing property rights elastically. When demand for reorganization rose, the quantity of legislation rose as well. When demand contracted, the quantity contracted. Parliament was, in other words, responsive to the demands of its constituents. In the last section of this essay, we discuss how this finding should influence our view of Britain's economic ascendance.

## **2: Literature on Politics in Industrializing Britain**

A school of thought has emerged recently on a topic of perennial interest: political reforms preceding Britain's industrialization. This school emphasizes Parliament's behavior during the eighteenth century, when the newly-empowered national legislature passed large quantities of legislation addressing local issues. Broadly it claims that Parliament served as an open and benevolent broker for this legislation, at least when compared to its past and when compared to the typical legislature in developing (and perhaps developed) nations today.

The view that Parliament was responsive stems from recent research by social scientists and historians. Douglas North, John Wallis, and Barry Weingast (2009) argue that Britain's medieval government represented the interests of a small segment of society, principally the aristocracy and clergy. As time passed, government recognized additional constituents, such as the gentry and merchants. Around 1700, Parliamentary sovereignty ushered in an era of "open access," in which the preponderance of the population could approach the legislature for assistance. Joel Mokyr (2002, 2009) examines the impact of the Enlightenment, a philosophic movement that spread around 1700. This philosophy emphasized government's role in solving practical problems and encouraging economic progress. It reduced rent seeking at all levels of government (Mokyr and Nye, 2007). Paul Langford (1991) argues that after 1700, British elites sponsored legislation that advanced their interests, while also expanding economic opportunities for the population in the vicinity. Julian Hoppit (1996) argues that after 1700, reforms provided Parliament the capacity to satisfy growing demands for local legislation. All of these scholars base their conclusions on historical arguments, qualitative evidence, and counts of acts passed by Parliament.

We construct a statistical test of this emerging view of Parliament. Our test asks: did

Parliament accommodate changes in the demand for local legislation during Britain's industrialization? Did Parliament operate as an open-access institution? To implement our tests, we count the annual numbers of acts that altered property rights between 1700 and 1830. These acts operated at the local or individual level. We compare this count to economic and political variables that influenced the benefits and costs of reorganizing rights to land.

The spirit of this exercise resembles the work of N.F.R. Crafts (1977) and Liam Brunt and Edmund Cannon (2009). These authors discuss the correlation between the number of enclosure acts, wheat prices, and interest rates. This essay extends that line of reasoning in several ways. First, this essay deals with crucial issues of statistical inference and identification. Its methods ensure that correlations between property rights and economic incentives arise for real reasons, rather than statistical phenomena that frequently generate spurious correlations between time-series variables that trend across time. Second, this essay derives its statistical tests from straightforward economic models that reveal how to appropriately interpret the estimates. Third, this essay examines both treatment and control groups. The control groups consist of acts that were processed using the same procedures as estate, enclosure, and statutory authority acts and that performed tasks similar to those acts, but which did not alter property rights. Fourth, this essay examines all types of acts that altered property rights arrangements, rather than one type among many. Our approach stems from our broader research agenda, which examines the evolution of modern property rights in industrializing England (Bogart and Richardson 2006, 2008, 2009). Finally, our test (and the logic underlying it) links the current consensus concerning British politics with Coase's ideas concerning property rights. We emphasize Parliament's importance as a forum for reorganizing rights to land and resources during the century preceding Britain's industrialization.

### **3. Acts that Reorganized Rights to Land and Resources**

This section describes estate, statutory authority, and enclosures acts and Parliament's procedures for passing them. These three types of acts possessed a common theme: they relaxed constraints on the use of land and resources. They did this in varying ways. Some of these acts created new rights. Others altered or annulled old rights. Some created new organizations, such as turnpike trusts. Others disbanded existing organizations, including ancient entities, such as village councils and manorial courts.

#### **3.1 Estates acts**

Estate acts enabled holders of property to take some action prohibited by the rules under which they had inherited their land. Estate acts were necessary because the inheritance system limited estate holder's power over their property, particularly the ability to sell or lease land. These restrictions adhered to the wishes of the deceased (who bequeathed the property to their descendents) to protect the interests of dependents and heirs and to preserve a family's estate for future generations (English and Saville, 1983, pp. 19-21). This system of inheritance, known as strict settlement, solidified during the seventeenth century and prevailed until the nineteenth century. A settlement was a generic name for a property transaction and for the documents created in its consummation. While estimates vary, at the peak, at least one-quarter and as much as three-fourths of land in England was held through strict settlements (English and Saville, 1983, pp. 11-12, 30). English legal and social historians have documented the operation of the system of strict settlements. We summarize that extensive literature's conclusions here (For additional details, see English and Saville 1983; Habakkuk 1994; Bogart and Richardson 2009).

Three features of settlements generated a need for Parliamentary involvement. First,

without an act of Parliament, holders of settled estates could only change the terms of the settlement when their heir came of age (i.e. reached the age of 21). Then, the holder and heir (typically father and son) could join forces and amend the settlement via the process of common recovery. Limited life spans meant that settlements could be changed only infrequently. A family might wait decades (or generations) for an heir to come of age and for the holder and heir to reach an agreement about restructuring the estate.

Second, settlements restricted the uses to which land could be put. The reason for these restrictions was to protect the rights of dependents and future heirs. Holders of a settled estate (who were just life tenants) could grant neither leases lasting beyond their lives nor leases from which they benefited at the expense of their heirs (such as leases in which tenants paid lump sums up front in return for concessions). Holders could seldom sell, swap, or mortgage property under their control. Holders could not alter property, even if they considered the alterations to be an improvement, without risking legal suits. The removal of trees, hedges, and buildings; the mining of minerals, quarries, and peat bogs; and the conversion of arable lands into pasture (or vice versa) could be considered waste, since these actions converted permanent resources into current income. All those who benefited from such actions could be liable for damages if dependents or heirs claimed to be harmed. Courts allowed sales, exchanges, mortgages, improvements, and long-term leases only if the settlement contained specific clauses authorizing such actions. Settlements written in the seventeenth and early eighteenth centuries seldom provided such powers, although as the eighteenth century progressed and as the law concerning settlements became increasingly sophisticated, settlements tended to provide broader powers.

Three, conducting transactions and enforcing contracts on settled land could be costly, uncertain, and insecure. Settlements were long, complex documents, often unpunctuated and

repetitious. Interpreting settlements required experience, skill, detailed knowledge of the document, and a large library of property laws, precedents, and legal texts estimated at 674 volumes in 1826 (English and Saville, 1983, p. 18). Settlements were not part of the public record. Copies of the deeds were usually held by the settlers, trustees, and lawyers. Settlements had to be consulted before taking out mortgages, drawing up leases, or completing sales, because if the settlement did not specifically authorize a transaction, the transaction could be voided. Ambiguities in settlements often deterred individuals from acting for fear that the transactions would be disputed.

Estate acts solved these problems. Estate acts facilitated the enforcement of contracts by clarifying permissible transactions and the rights of pertinent parties. Estate acts authorized actions previously prohibited by settlements such as the mortgaging of property, cutting of old-growth timber, and mining of ores and minerals. Estate acts authorized the sale and leasing of land. The authorization of sales and leases was one of the most significant economic effects of estate acts, since large tracts of English land were exposed to market forces.

### 3.2 Statutory Authority Acts

Statutory authority acts fostered the construction, improvement, and maintenance of infrastructure and social services. Statutory acts focused on particular topics. *Transportation acts* promoted roads, bridges, river navigation, ports, canals, and railways. *Urban improvement acts* provided for street paving, gas lighting, garbage collection, sewage extraction, water provision, and police protection. *Government building acts* fostered the construction of prisons, courthouses, and county administrative offices. *Poor relief acts* provided assistance for the poor and encouraged the construction of workhouses. *Court of small request acts* established legal forums for adjudicating credit contracts valued at less than 40 shillings. *Lighthouse acts*

authorized the construction of new lighthouses. The history of statutory authorities has been documented by several scholars (see Webb and Webb 1963, Willan 1964, Albert 1972, Innes 1998). We briefly summarize this literature.

Statutory authority acts were necessary because existing governmental entities—parishes, counties, boroughs, and sewer commissions—lacked appropriate fiscal devices and clear powers of eminent domain. River navigation provides an illustration. In the early seventeenth century, most tidal rivers were under the authority of Commissions of Sewers. Commissions could compel landowners to cleanse waterways and could tax land along riverbanks to pay for upkeep, but not tax individuals who traveled on the river or drank its waters and could not purchase land along a waterway or divert its course. These limitations kept sewer commissions from improving and extending navigable waterways.

To encourage the improvement and expansion of infrastructure, Parliament passed statutory authority acts that established organizations whose trustees served without remuneration and served in the public interest or they established for-profit corporations such as joint-stock companies, whose directors purchased shares and profited from their investments (Webb and Webb 1963). To these new organizations, statutory authority acts granted an array of rights. One was the right to levy user-fees and/or raise revenue through other means. A turnpike act, for example, authorized a trust operating a turnpike to levy tolls on road-users and claim labor (or the equivalent in taxes) from inhabitants along the road. The tolls marked a significant departure from the existing system, in which parishes paid for road improvements with local labor and property taxes, and in which individuals possessed the right of free passage. Trustees also received the right to issue debt and equity. The bonds were secured by the tolls. If interest payments fell into arrears, bondholders could seize the toll revenues.

Statutory authority acts gave organizations the right to purchase land along a route's right of way and defined procedures for doing so. The act authorized the organization to negotiate with landowners. If the parties could not agree on the price for a necessary plot of land, the organization could appeal to a body of commissioners who could compel the landowners to sell. These procedures provided the legal origin for modern laws concerning eminent domain.

Statutory authority acts limited the powers of trustees. Turnpike acts, for example, defined maximum tolls. In each act, a schedule distinguished different types of traffic and goods, and for each group, a maximum permissible toll. Similar schedules regulated the issuance of debt and terms of interest.

### 3.3 Enclosure Acts

Enclosure acts reorganized rights to property, usually in open-field agricultural villages. At the beginning of the eighteenth century, approximately one-quarter of the arable land in England lay in such villages, where residents shared rights to communal assets, such as water, pasture, and woods. Villagers also shared rights in the large open fields, which served as common pasture during fallow periods and as cropland during the growing season. The cropland was divided among the residents, who possessed the right to grow grain on acre-sized plots scattered throughout the fields and intermingled with those of their neighbors. Villagers managed these collective assets, such as the open arable fields, through village institutions, including customary laws and manorial courts.

The problems of the open field system have been well documented by scholars.<sup>2</sup> Collective decision-making and communal land use complicated investments in drainage, the conversion of land use, and the adoption of new techniques. Scattered plots wasted time and

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<sup>2</sup> For a sample of works see Tate (1967, 1978), Turner (1980, 1984), Wordie (1983), Allen (1992), Clark (1998, 2001), and Richardson (2005).

resources. Common pastures encouraged over-grazing and hindered breeding.

Parliamentary enclosure acts replaced collective ownership of common resources with individual ownership of particular plots of land, and replaced collective management through village institutions by individual management of personal estates. An enclosure act appointed a commission to devise the plan of enclosure and implement the terms of the act. The commission employed surveyors to draw a map of the village with its open fields and strips, tofts and crofts, waste and pasture, and other physical features. The surveyors recorded the holders of rights to all of these assets. At a series of public meetings, holders of land (and all other rights in the village) advanced claims as to what they should receive under the new arrangements. The commissioners decided on the validity of these claims. After they made their decisions, the surveyors created a map of the new village, displaying the new features, such as fields, roads, fences, and irrigation channels, and the owners of each.

### 3.4 The Process of Passing Acts

The passage of estate, statutory authority, and enclosure acts required time, resources, skill, and expertise. Individuals and communities had to organize and submit applications. Legislators in Parliament had to review the provisions of the act, including appropriate changes to individual, communal, or group rights and clauses or limitations appeasing opposition groups. Clerks in Parliament had to write the acts and ensure they contained language enforceable in common law or equity courts. Other officers of Parliament, including the Yeoman Usher and the Doorkeeper, handled the acts at various points as they moved through the legislative process.

The procedures for passing estate, statutory authority, and enclosure acts were standardized in the late 1600s and early 1700s and operated with only minor adjustments through the late nineteenth century (Clifford 1885, Williams 1945). An estate act began with a petition

from an individual or family desiring to change the rules regarding their estate. A statutory authority act also began with a petition, usually from a community stating a problem, such as insufficient road capacity between two places, or a promoter proposing a new project, like a canal or railway. Parties interested in an enclosure held a series of public meetings in their village to discuss the issue, and then drafted a petition signed by a sufficient group (typically four-fifths) of individuals possessing rights to the land under consideration.

Petitions could be submitted to either House of Parliament. A Parliamentary committee investigated the merits of each petition. In the Commons, committees consisted of Members of Parliament (MPs) who had knowledge of the individuals or localities involved. In the Lords, committees consisted of Lords of Parliament (Peers) with knowledge of the issue at hand, although it became standard practice to let any peer participate on a private bill committee if they desired to do so. If the committee deemed a petition beneficial, then it became a bill that was read at least three times to the entire House (either Lords or Commons), where members could suggest amendments. These amendments typically clarified provisions of the bill rather than changed its substance. After the House approved the bill, it was engrossed (i.e. written on parchment) and sent to the other House, where it was once again subject to public review. After receiving approval of the other house, the bill was sent to the King for royal assent. Once the King approved, the bill gained the force of law.

Public notice ensured that individuals with vested interests knew about relevant legislation. Interested individuals often appeared before Parliament to support or oppose bills. Estate bills could be opposed by any beneficiary, creditor, or claimant of the estate. Opposition might come from immediate family members, distant relatives, trustees, bankers, or their legal representatives. Enclosure bills could be opposed by anyone with rights to the lands under

consideration or with interests in the village about to be reorganized. Opposition might come from tenants, small holders, or other parties who thought that they deserved more compensation for the rights that the legislation would extinguish. Statutory authority bills could be opposed by a broader range of persons, such as neighboring landowners, nearby towns, and rival operators. Opponents of legislation could air their grievances if called as witnesses by the committee or if they volunteered to be heard. Opponents could also submit a counter-petition that amended the original legislation or offered an alternative to the original proposal. Some bills aroused so much opposition that they failed to become acts. Others became law, but only after the bill included substantial amendment to appease opposition groups.

The cost of proposing and opposing legislation appears to have been moderate and stable. Petitioners paid fees to the clerks of Parliament and officers of the Houses of Commons and Lords. Standing orders dictated the schedule of fees (Clifford 1885, pp. 716-751). The fees increased for longer bills with multiple provisions or when multiple parties were involved. On several occasions, Parliament debated the efficacy of the fee schedule. Leaders of the Commons advocated the fee-for-service approach on the grounds that the fees justly compensated clerks and officers for their efforts and encouraged clerks and officers to work diligently. In 1821, a select committee argued that fees should be retained because they “stimulate[d] the exertions of [officers] during periods of accumulated business (Clifford 1885, p. 741).” MPs and Peers received no direct compensation for introducing and advocating bills, but politicians may have been rewarded indirectly, by receiving electoral support, payments in kind, patronage, or side payments.

Petitioners also paid solicitors or ‘parliamentary agents’ to prepare the paperwork and guide their bill through Parliament. Agents presented arguments, gathered evidence, and

prepared witnesses for committee proceedings. Agents' fees could be substantial. Evidence from a sample of bills in the 1830s shows that fees paid to agents amounted to 50 to 80 percent of the cost of obtaining an act. Fees to Parliamentary officers comprised the remainder (Great Britain, 1833).

#### 4. Data

The Parliamentary Archive maintains a computerized catalogue, *Portcullis*, which indicates the clerical title, calendar year, regal year, and parliamentary session for all acts passed since the sixteenth century.<sup>3</sup> Clerks inscribed clerical titles on the exterior of a roll of parchment containing the full text of an act when Parliament reviewed the original legislation. The clerical title summarized the act, usually in a concise paragraph containing enough information for the clerks to identify the act and its principal provisions amidst thousands of similar pieces of parchment, without opening the rolls to read the full text.

Earlier papers explain processes for converting the clerical title of every act of Parliament into a vector of variables (Bogart and Richardson, 2006, 2008). Figure 1 plots the annual number of acts dealing with estates, statutory authorities, and enclosures from 1700 to 1830. Estate acts were the most common type of legislating altering property rights in the early 1700s. Statutory authority acts increased in number throughout the century. Enclosure acts became common from 1760 to 1820. The number of all of these acts varied greatly from year to year.

The top-half of Table 1 describes the series on estate acts. Row (a) refers to the series indicating the total number of estate acts passed each year. Column (1) indicates that ALL of these acts altered property rights. Column (2) indicates that SOME of these acts also altered

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<sup>3</sup> <http://www.portcullis.parliament.uk>. The clerical titles within Portcullis were first published in two nineteenth century compilations of Parliamentary legislation, *Statutes of the Realm* (Great Britain, 1800) and *Statutes at Large* (Great Britain, 1807), which were computerized during the 1990s.

personal rights. Columns (3) through (6) describe the statistical properties of the series. We refer to this as the series in “levels”, since it is based on the raw series indicating the annual number (or level) of acts passed. Columns (7) through (10) present the same information for the series in differences (i.e. the change in the number of acts passed from year  $t-1$  to year  $t$ ). Row (b) describes a time series indicating the annual number of estate acts that authorized the sale of property. Row (c) indicates the annual number of estate acts that authorized the leasing of property. Our analysis emphasizes estate acts authorizing sales and leases because these acts placed land long bound by the fetters of the past onto the market.

Rows (e) through (h) of Table 1 describe the data that serve as a comparison (or placebo) group for estate acts. These non-estate private acts dealt with issues of marriage, naturalization, and appointments to office. Marriage acts permitted individuals to marry and/or divorce in contravention of secular and religious statutes. Naturalization acts provided foreign-born denizens with the rights of native-born citizens. Office acts appointed individuals to positions in the royal household, courts of law, executive agencies, and other positions that provided government-funded livings. Important similarities existed between these marriage, naturalization, and office acts (collectively called non-estate private acts) and the estate acts examined in the top of the table. When processing all of these acts, Parliament followed common procedures. Similarities also existed in the clientele that requested these acts, the demographic and social forces that generated demand for these acts, and the political factors that influenced the supply of these acts. A key feature, however, distinguishes estate and non-estate private acts. The value of estate acts varied with economic conditions that influenced the costs and benefits of reorganizing rights to land. The value of marriage, naturalization, and office acts did not.

The top-half of Table 2 describes statutory authority acts. Row (a) indicates the annual

number of statutory authority acts passed each year. Row (b) indicates the annual number of acts pertaining to transportation, principally roads, canals, harbors, rivers, bridges, and railways. Row (c) indicates the annual number of acts pertaining to urban improvements, principally the provision of water, sewers, market infrastructure, public buildings, gas lighting, garbage collection, church maintenance, courts of small request, poor relief, prison construction, and police protection. Column (1) indicates whether these acts reorganized rights to land and resources. Column (2) indicates whether these acts facilitated or financed the improvement of infrastructure (I) or the provision of public services (S). The definitions of the columns (3) through (6) and (8) through (11) are identical to the definitions of the corresponding columns in Table 1. Columns (7) and (12) indicate whether the series are stationary, as determined by an Augmented Dickey-Fuller Test. While several series are non-stationary in levels, all of the series are stationary in differences.

The bottom-portion of Table 2 describes the placebo group for statutory authority acts: government finance acts. These acts dealt with national government expenditure and taxation. Most pertained to excise, customs, and land taxes; purchasing ships; provisioning of military forces, and constructing military fortifications. Like statutory authorities, these acts financed the provision of public goods, and their passage through Parliament required balancing local and broader interests. Unlike statutory authority acts, however, demand for these acts depended largely on the dictates of foreign affairs, and little on the costs and benefits of reorganizing rights to land and resources.

Table 3 describes enclosure acts. The last row of the table describes the placebo group, amendments to enclosure acts. Amendments serve as an illuminating comparison because their passage followed procedures identical to initial enclosure acts, but demand for amendments

arose primarily after random instances when errors crept into original legislation during the long process of passing bills in Parliament.

The accuracy of the data depicted in Tables 1 through 3 depends upon our ability to accurately determine the year in which acts passed. We can do that with confidence for years after 1762. For the early part of our sample period, a minor complication arises. A convention dated all acts passed by a session of Parliament as if they passed on the opening day of the session. This convention lingered from an earlier period when Parliament met infrequently at royal request and handled a limited volume of business in a short time period. After 1689, Parliament met annually. Sessions began in the fall, usually in the months of October, November, or December; lasted throughout the winter; and adjourned in the spring. These conventions complicate the dating of acts for the Parliaments of 1714-1715, 1751-1752, and 1760-1761. In these years, the monarch died, and/or Parliament opened late. In 1714, for example, Queen Anne died. George I assumed the throne. His ascension delayed the opening of Parliament until January of 1715. This parliament adjourned in the spring and another opened on schedule during the next fall. So, in the year 1715, the conventional dating method assigned the acts passed in two Parliamentary sessions – the winters 1714-15 and 1715-16 – to one calendar year, 1715. We correct for this confusion by assigning dummy variables to the years in which Parliament did not meet and the years in which Parliament met twice. In the example above, a dummy is included for 1714, 1715, and 1716. We have also corrected for this by assigning legislation to the years in which they appear to have been passed and by running all of our regressions only for the years of 1763 to 1830, for which we can precisely date all acts. Our conclusions remain robust regardless of the way in which we date acts from these idiosyncratic years.

Table 4 lists the right-hand-side variables in our regression analysis. Rows (a) and (b) refer to the key explanatory variables, the real interest rate and the volume of foreign trade. The real interest rate determined the cost of investment and rate of inter-temporal exchange, which were principal factors determining the returns from reorganizing property rights. Our real interest rate is the nominal interest rate, measured as the yield on long-term government bonds, known as 2 ½ % consols from Neal (1990), minus inflation, measured as a three-year moving average of the percentage change in Clark's (2001) consumer price index. The volume of foreign trade was linked to aggregate economic activity, which was a principal determinant of revenues earned from improving infrastructure and reallocating resources towards more productive uses. The volume of trade also measured the health of the industrial and mercantile sectors relative to agriculture. Our measure of the volume of foreign trade, like most scholars, is the sum of the official value of imports plus exports (Mitchell, 1988). The official values reflect changes in the quantity of imports and exports weighted by a particular set of prices fixed at the outset of the eighteenth century. Rows (c) through (j) summarize the control variables including years when the monarch died, when a new prime minister assumed office, when Parliamentary elections occurred, when Britain was at war, when Britain suffered disease epidemics, and when Britain changed the structure of its land tax system. The land tax rate is in shillings per acre. An index of climatic conditions based on tree ring measurements controls for fluctuations in the aggregate economy due to exogenous shocks to agricultural productivity.

Figures 2 through 4 illustrate the correlation between annual changes in the real interest rate and annual changes in legislation reorganizing property rights. The top panels of the figures show that the number of acts increased when the interest rate fell. The bottom panels show that this correlation did not exist with the placebo group.

## 5. Methods

This section establishes a framework for analyzing data described in the preceding section. The objective is to organize our thoughts and to elucidate reasonable ways in which to interpret patterns in the evidence. The exercise begins with intuition standard among social scientists. Private parties desired Parliament to pass acts. Their desires fluctuated as the value of acts fluctuated. Economic conditions which altered the net benefits of reorganizing rights propagated those fluctuations. Economists summarize such relationships with an inverse demand function.

$$(1) \quad p_d = F(q_d, X)$$

In this equation,  $p_d$  indicates the maximum amount that the public would expend to secure the passage of a certain quantity of legislation,  $q_d$ .  $X$  indicates the array of economic factors that influenced the net benefits of legislation.  $X = \{x_1, x_2, \dots, x_I\}$ , where  $x_i$  represents the  $i^{\text{th}}$  factor. To keep the notation clear, assume  $0 < \partial F / \partial x_i < \infty \quad \forall i = 1, \dots, I$ . Since  $F$  represents demand,  $\partial F / \partial q < 0$ .

The number of acts depended upon the time, effort, and resources that the legislature and bureaucracy expended in the approval process as well as factors that influenced legislative productivity, such as elections, changes in governments, monarchical mortality, and the need to devote time to alternative matters, such as discussing military and international affairs. The number of acts passed also depended upon the lawyers, lobbyists, and peripheral personnel that applicants employed to prepare and advance their petitions as well as the procedures, campaign contributions, and side payments – both in the capital and the local community – that lubricated lawmaking in London.

Petitioners had numerous routes for bringing bills before the Houses of Lords and

Commons. Petitioners could choose among numerous lawyers that prepared petitions and approach any MP. We summarize this process with a supply function.

$$(2) \quad p_s = G(q_s, Z)$$

$p_s$  indicates the costs of passing a quantity of legislation,  $q_s$ , during a particular year.  $Z$  indicates the array of factors influencing the supply of legislation during that year. Symbolically,  $Z = \{z_1, z_2, \dots, z_J\}$ , where  $z_i$  represents the  $j^{\text{th}}$  factor. To keep the notation clear, assume

$\partial G / \partial z_j > 0 \quad \forall \quad j = 1, \dots, J$ . In the short run, increasing the quantity of acts required more intensive employment of factors with diminishing returns and rising costs. So,  $\partial G / \partial q \geq 0$ .

The interaction of supply and demand determines the quantity of acts that Parliament passes. This equilibrium occurs when the demand price,  $p_d$ , equals the supply price,  $p_s$ , plus some markup,  $m$ .

$$(3) \quad p_d = p_s + m$$

If the markup exceeds zero, then someone in the act-passing process (either lobbyists, opponents of the legislation, or MPs) were able to extract some of the surplus generated by the legislation, and the equilibrium occurs at the intersection of the supply and marginal revenue curves. If the markup equals zero, then the act-passing process was completely competitive, and the equilibrium occurs at the intersection of the demand and supply curves.

Substituting Equations (1) and (2) into Equation (3) reveals the number of acts passed in equilibrium.

$$(4) \quad F(q^*, X^*) - G(q^*, Z^*) = m$$

Here, the asterisk superscript indicates quantities of variables in equilibrium. Rewriting the equilibrium condition emphasizes the implicit relationship between the equilibrium values of the variables.

$$(5) \quad H(q^*, X^*, Z^*) \equiv F(q^*, X^*) - G(q^*, Z^*) = m$$

The implicit function theorem describes the relationship between the function,  $H$ , the equilibrium level of quantity demanded,  $q^*$ , and the variables that shift supply and demand,  $X$  and  $Z$ .

$$(6) \quad q^* = Q(X^*, Z^*)$$

$$(6') \quad \frac{\partial q^*}{\partial x_i} = (-1) \frac{\partial H(q^*, X^*, Z^*) / \partial x_i}{\partial H(q^*, X^*, Z^*) / \partial q^*} = \frac{-\partial F(q^*, X^*) / \partial x_i}{\partial F(q^*, X^*) / \partial q^* - \partial G(q^*, Z^*) / \partial q^*}$$

$$(6'') \quad \frac{\partial q^*}{\partial z_i} = (-1) \frac{\partial H(q^*, X^*, Z^*) / \partial z_i}{\partial H(q^*, X^*, Z^*) / \partial q^*} = \frac{-\partial G(q^*, Z^*) / \partial z_i}{\partial F(q^*, X^*) / \partial q^* - \partial G(q^*, Z^*) / \partial q^*}$$

The total differential of (6) provides a linear approximation of the relationship in the neighborhood of the equilibrium.

$$(7) \quad Dq^* = DQ(X^*, Z^*) = \sum_{i=1}^I \frac{\partial q^*}{\partial x_i} dx_i + \sum_{j=1}^J \frac{\partial q^*}{\partial z_j} dz_j$$

This relationship can be estimated with the data described in the preceding section. The change in the quantity of acts,  $Dq^*$ , is the change in the number of acts passed from year  $t-1$  to year  $t$ . The changes in the independent variables,  $dx_i$  and  $dz_j$ , are changes in variables that influence demand and supply from year to year. The estimating equation is

$$(8) \quad \Delta A_t = \sum_{i=1}^I \alpha_i \Delta x_{i,t-1} + \sum_{j=1}^J \beta_j \Delta z_{j,t-1} + \varepsilon_t$$

where  $\Delta A_t$  is the change in the number of acts from  $t-1$  to  $t$ .  $\Delta x_{i,t-1}$  is the change in the  $i^{\text{th}}$  demand shift variable from  $t-2$  to  $t-1$ .  $\alpha_i$  is an estimate of  $\partial q^* / \partial x_i$ .  $\Delta z_{j,t-1}$  is the change in the  $j^{\text{th}}$  supply shift variable from  $t-2$  to  $t-1$ .  $\beta_j$  is an estimate of  $\partial q^* / \partial z_j$ .  $\varepsilon_t$  is an error term. Explanatory variables are lagged one-year or two years to capture the time necessary to respond to changing

circumstances, prepare petitions, approach Parliament, and request acts.<sup>4</sup>

Our estimates of  $\partial q^*/\partial x_i$  and  $\partial q^*/\partial z_j$  do not allow us to recover the parameters of the underlying supply and demand curves,  $F$  and  $G$ . However, proposition 1 indicates how the estimates enable us to characterize the shape of the supply curve.

Proposition 1. If  $\partial q_*/\partial x_i \neq 0$  for some  $i$ , then  $\partial G(q_*, Z_*)/\partial q_* < \infty$ .

Proof. This is a proof by contraposition. Assume  $\partial G(q_*, Z_*)/\partial q_* = \infty$ . Then,

$$\frac{\partial q_*}{\partial x_i} = \frac{-\partial F(q_*, X_*)/\partial x_i}{\partial F(q_*, X_*)/\partial q_*} = 0 \quad \forall i = 1, \dots, I \quad \text{because } \partial F(q_*, X_*)/\partial q_* < 0 \text{ and } \partial F(q_*, X_*)/\partial x_i < \infty.$$

In prose, Proposition 1 indicates that if the quantity of acts fluctuated in response to fluctuations of one (or more) of the factors that influenced the demand for acts, then the supply curve for acts was not perfectly inelastic.<sup>5</sup> Determining whether  $\alpha_i$ , our estimate of  $\partial q_*/\partial x_i$  differ from zero involves the traditional hypothesis test for statistical significance.

In cases where economic theory or external evidence indicate that a variable shifts only demand, then our estimates reveal more about the shape of the demand function. For example, standard investment theories and previous historical studies indicate that the real interest rate influenced the demand for investing in infrastructure, and thus, the demand for acts of Parliament reorganizing rights to enable investment in infrastructure. If the estimated coefficient on the real interest rate is large, then either the interest rate had a large effect upon the demand for acts, or the supply of acts was highly elastic, or both. Similar arguments hold true for variables that shifted the supply of acts. In cases of variables that shifted both the supply and demand, our

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<sup>4</sup> A one-year lag seems to be the most sensible specification, given the nature of the decision-making and Parliamentary process. Our regression's lag structure is robust to reasonable permutations. Regressions using contemporaneous changes or lags distributed over spans up to five years yield qualitatively identical results.

<sup>5</sup> A similar proposition states that if the quantity of acts fluctuated in response to fluctuations of one (or more) of the factors that influenced the supply for acts, then the demand curve for acts was not perfectly inelastic. We do not focus on this issue below, although our control variables could be used to test for demand elasticity.

estimates reveal the net effects.

Our placebo groups ensure that our assumptions about whether variables shifted demand are accurate. Our placebo groups also reinforce our results in other ways. It possible that our regressions do not control for an unobserved factor correlated with both an independent variable (such as the real interest rate) and the number of acts reorganizing rights to land and resources (our dependent variable). The exclusion of this unobserved variable might make it appear as if the real interest rate influenced the demand for acts, when in actuality, the excluded variable was the source of the correlation. Placebo groups indicate whether correlations existed between our independent variables (such as the real interest rate) and acts that did not reorganize rights to land and resources. If such correlations existed, then our regressions may reveal spurious, rather than real, relationships.

## **6. Results**

Table 5 presents results for estate acts. Columns (1) through (4) regress the year-to-year change in the annual number of estate acts authorizing the sale or lease of land on year-to-year changes in the key explanatory variables, the real interest rate and the volume of commerce. The regression spans the 124 years for which we have data suitable for statistical analysis. The initial year, 1705, lies close to the point where Parliament formalized procedures for processing acts regarding property rights. The final year, 1830, lies close to the nationwide reform of Parliamentary elections and procedures enshrined in the Great Reform Act of 1832. The standard errors are calculated using the Newey-West procedure for estimating a heteroskedastic and autocorrelation consistent covariance matrix. All the variables are stationary in differences.

The table explores the temporal relationship between the explanatory and dependent variables. Column (1) lags the explanatory variables by one year. Column (2) lags the

explanatory variables by two years. Column (4) includes both lags. The results reveal significant correlations for the real interest rate for both the first and second lags, with the second being stronger. Column (4) reports the sum of the coefficients for the change in the real interest rate lagged one and two years. The sum of this distributed lag (-0.51) is statistically significant, as is the F-test on the regression as a whole, indicating that estate holders and Parliament reacted to the changes in the real rate of interest over a period of two years. Columns (3) and (4) add control variables including years of elections, years in which the prime minister changed, years in which the monarch died, changes in the real land tax rate, changes in the tax code, changes in climate (derived from tree-ring data), changes in the disease environment (as measured by the onset and end of epidemics), and changes in the incidence of war. This spectrum of control variables improves the fit of the regression, but do not alter the results.

An array of checks demonstrates the robustness of these regressions to a wide range of alternative specifications. Neither the signs nor the significance levels of the coefficients change when the endpoints of the analysis change by up to two decades. The signs and significance levels are also invariant to the inclusion of additional explanatory variables such as year-to-year changes in the level of population, industrial production, and Parliamentary majorities. Columns (5) through (9) provide additional confirmation by replacing the dependent variable with placebo groups including marriage, naturalization, office, and all non-estate private acts. The placebos resembled estate acts in many dimensions but placebos did not alter rights to land and resources. In all of the placebo tests, the dependent variable is uncorrelated with the real interest rate. This result has two important implications. First, the excluded exogenous variables which influenced Parliament's passage of private acts did not drive the results in Columns (1) through (4). If they did, then similar patterns should appear in (5) through (9). Second, the real interest rate

influenced the passage of estate acts through demand-side channels, since if interest rates influenced the way in which Parliament supplied acts, then changes in interest rates should be correlated with changes in all types of acts, including non-estate private acts.

Table 6 replicates these results for the years 1763 to 1830, which span the generations during which the Industrial Revolution began, spread, and accelerated. The years also span the period for which all acts are accurately dated and other statistical series pose the fewest problems. Columns (1) through (3) and (6) through (10) demonstrate that the relationship between real interest rates and the number of acts reorganizing rights to land holds for this key period and for the cleanest data. Column (4) shows that these results hold when the dependent variable is limited to only acts that authorized sales of strictly-settled land. Column (5) shows that these results hold when the dependent variable is limited to acts that authorized the lease of strictly-settled lands.

Table 7 presents results for statutory authorities. Column (1) regresses the change in the number of statutory authority acts on changes in the real interest rate and the volume of trade. Column (2) adds control variables. Column (3) includes explanatory variables lagged both one and two years. Column (4) restricts the sample to the years between 1763 and 1830. Column (5) restricts the analysis to statutory authorities dealing with transportation (i.e. roads, canals, harbors, rivers, bridges, and railways). Column (6) restricts the analysis to statutory authorities related to the improvement of urban infrastructure and provision of urban services (i.e. the provision of water, sewers, market infrastructure, public buildings, gas lighting, garbage collection, church maintenance, courts of small request, poor relief, prison construction, and police protection). The results reveal a strong statistical correlation between economic conditions that influenced the value of statutory authorities and the number of statutory authorities passed

by Parliament. The magnitude of the coefficients on our demand shift variables averages a little less than -1.0 for the change in the real interest rate and a little below 1.0 for the change in trade. The standard errors on those variables average about 0.30 and 0.28 respectively. The small size of the standard errors relative to the magnitudes indicates that the coefficients are measured precisely. Column (8) examines the placebo group: changes in the number of government finance acts. The placebo is uncorrelated with changes in real interest rates and the volume of trade. This indicates that omitted variables cannot account for the observed relationship between statutory authority acts, real interest rates, and the volume of trade.

Table 8 examines enclosure acts. Columns (1) through (3) illuminate the correlation between enclosures and interest rates. The reaction to changes in the real rate appears to have occurred over a period of two years. Column (4) examines the placebo group, acts amending enclosure acts. The placebo appears uncorrelated with the real interest rate, which suggests that the variation in the number of enclosure acts was not driven by unobserved factors that altered the costs of creating acts.

Together, Tables 5 through 8 establish our key empirical finding: the equilibrium number of acts reorganizing property rights changed in response to changes in the real interest rate and volume of trade, two principal determinants of returns from reorganizing property rights. Our demand-and-supply framework reveals one way to interpret this result. The supply curve for acts of Parliament was elastic. The political process, in other words, responded flexibly to demands to reorganize property rights.

How responsive was Parliament to changes in the demand for acts reorganizing rights? A few calculations reveal the answer to this inquiry. The sum of the coefficients for the real interest rate in Tables (5), (7), and (8) are -0.51, -1.2, and -1.37. Multiplying those coefficients with the

standard error of the real interest rate (4.9) indicates that a one standard deviation decline in the real interest rate coincided with an increase of 2.5 in the number of estate acts, an increase of 5.8 in the number of statutory authority acts, and an increase of 6.7 enclosure acts. Thus, a one standard deviation decline in interest rates explains approximately 30% ( $\sim 2.5/8.7$ ) of a standard deviation change in the number of estate acts, 36% ( $\sim 5.5/15.9$ ) of a standard deviation change in the number of statutory authority acts, and 53% ( $\sim 6.7/12.7$ ) of a standard deviation change in the number of enclosure acts. Similarly, the standard deviation of the change in trade is 4.66. The sum of the coefficients on trade in table 7 is 0.98. The product of those numbers is 4.5. Thus, a one standard deviation change in the volume of trade explains 28% of a standard deviation change in the number of statutory authority acts. Fluctuations in trade explain around 23% of the variation in transportation acts and 23% of the variation in urban acts.

In sum, changes in real interest rates and the volume of trade explain much of the annual fluctuation in estate, statutory authority, and enclosure acts. This indicates that these variables had a large effect on the demand for acts, or the supply of acts was highly elastic, or both. This result is consistent with the emerging consensus concerning Parliament's behavior in industrializing England. Parliament accommodated the public's demand for legislation reforming property rights for families and communities. These acts comprised the preponderance of the local legislation passed by the national legislature.

## **7. Discussion**

At the opening of the eighteenth century, Parliament established a forum for reorganizing rights to land and resources. This venue enabled individuals, families, and communities to exploit opportunities that could not be accommodated by the inflexible rights regime inherited from England's past. The forum operated flexibly. When the public's demand for reorganizing

property rights rose, Parliament passed more acts reorganizing rights. The previous sections of this paper demonstrated that fact, by showing that when returns from reorganizing rights increased – because of falls in the rate of interest or booms in foreign trade – the public requested and Parliament passed larger numbers of acts.

These findings expand Coase’s insights into Parliament and property rights in industrializing Britain (Coase 1974). Coase argued that in a world with transaction costs, some distributions of property rights promote efficiency. Other distributions trap people in poverty. Parliament and common law courts understood this principle, and strove to assign rights in a way which maximized the wealth of the realm. The evidence presented in this essay shows that Parliament operated in this way since the early 1700s, a century and a half before the era studied by Coase.

Did Parliament’s behavior influence Britain’s economic development? Examples from England’s industrialization illustrate the relationship between Parliament, property rights, and economic expansion. The first is Lancashire’s turnpike building boom. During the 1760s and 1770s, technological innovations dramatically lowered the cost of spinning cotton yarn and dramatically increased the production of cotton cloth. The center of this textile boom was a region around the city of Manchester. In 1780, few improved roads linked Manchester with the textile towns emerging in its vicinity. During the next decade, localities and entrepreneurs sought to improve the road network. They could not do so without reorganizing property rights. So, a steady stream of turnpike bills appeared before Parliament. Most of the bills came in the years following surges in the textile production, often as the result of exogenous shocks. In 1792, for instance, the revolution in France and a blockade of French ports reduced competition for English manufacture. English imports of raw cotton rose and exports of finish cloth surged. In

the following year, 1793, Parliament received a surge in turnpike proposals from the Lancashire textile region exceeding all of the acts proposed in the previous ten years combined, and within a few months, Parliament passed all of the acts.

A second example comes from London's expansion during the eighteenth and nineteenth centuries, when London became the richest and one of the largest cities in the world. This expansion required agricultural land on the city's periphery to be converted to residential and industrial uses. Existing property rights, however, prevented some of this land from being redeveloped. Prohibitions on selling land and signing long-term leases deterred development. Developers feared that they would not be able to reap the returns from investments and that successful building projects would be held-up after the fact. To solve these property-rights problems, holders of equitable estates sought Parliamentary assistance. Landholders did this more often when interest rates fell and profits from development rose.

This connection is particularly clear during the 1750s and 1760s, when the Seven Years War and harvest failures pushed interest rates to prohibitive levels. Spikes in interest rates coincided with declines in the number of estate acts. In 1761, for example, because of the exorbitant yield on government bonds, private lending virtually ceased (Belcher, Cottrell, and Sheppard 1979, p. 186). During the next three years, landholders on London's periphery sought few acts for reorganizing rights. In 1765, however, the yield on government bonds dropped to around 3.25%. A building boom ensued. During the next three years, land holders sought large numbers of acts reorganizing rights to estates on London's periphery.

The texts of these acts prove particularly illuminating. Consider George Forster Tuffnell. In 1766, Tuffnell held property in Islington and Holborn, just outside the city. From Parliament, Tuffnell obtained an act that declared

“From the great increase of buildings which have lately been in the Parish of Islington... (Tuffnell) had a fair prospect and opportunity by granting building leases to make a considerable improvement and to increase the yearly income... But Tuffnell is, by the terms of the will, disabled from making and granting leases of any part of the said premises to any persons so as to encourage them to make such improvements, without the aid and authority of Parliament.”<sup>6</sup>

So, Parliament altered the terms of Tuffnell’s estate, allowing him to sign 99-year building leases, which provided a contractual condition conducive to development.

The service that Parliament provided to Tuffnell and thousands of similar petitioners was to rewrite rules regarding the use of property. Parliament possessed the authority, skill, and capacity to do this. Parliament established a system able to handle a high volume of requests, with reasonable fees, and a rapid and thorough forum for addressing constituents’ concerns.

Parliament’s impact on the property-rights system appears to have increased during the eighteenth and nineteenth centuries, as the constraints inherent in England’s medieval property-rights systems became increasingly binding. Relaxing these constraints was probably a necessary condition for English economic development. Statutory authorities played a large role in the urbanization and commercialization of the English economy. Statutory authorities provided fresh water, removed garbage, aided the indigent, operated forums for dispute resolution, and financed police forces. These services were essential for enabling large populations to live in small areas. Statutory authorities established a high-volume, long-distance transportation network. Canal companies enabled coal to reach emerging manufacturing centers. Harbor-improvements increased the number and draft of ships which could load and unload, facilitating the expansion of maritime commerce. Turnpikes reduced freight charges and travel times by widening, resurfacing, and maintaining thoroughfares (Bogart, 2005).

Estate acts – particularly those authorizing the sale and lease of land – exposed land to

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<sup>6</sup> See Private Act 6 George III c.45.

the invisible hand. Freeing resources from the shackles of the past loosened constraints on landowners, facilitated the reallocation of physical and financial assets to new and lucrative uses, and enabled the exploitation of opportunities arising in a dynamic economy. The lowering of transaction costs enhanced efficiency and encouraged investment (Bogart and Richardson 2009). The benefits of estate acts extended beyond the persons and property involved. Estate acts established precedents. Knowledge of what Parliament would decide when confronted with a case helped to resolve disputes within families, to safeguard the interests of investors, to determine the distribution of rents within ongoing business arrangements, and to prevent the holding-up of new projects by those seeking an inordinate share of the profits. The development of institutions solving such problems has long been considered to be one of the principal institutional innovations underlying modern capitalist economies.

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Table 1: Estate and Other Private Acts, Summary Statistics

Type of Acts	Δ Rights		Series in levels				Series in differences			
	Land	Personal	Avg	SD	Min	Max	Avg	SD	Min	Max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Estate Acts										
(a) All Estates	All	Some	22.7	11.1	0	66	0.2	13.0	-55	65
(b) Estates that authorizes sales	All	Some	11.1	6.3	0	34	0.1	7.0	-34	26
(c) Estates that authorizes leases	All	Some	3.5	3.1	0	24	0.1	3.0	-12	16
(d) Estates that authorizes sales or leases	All	Some	14.5	7.9	0	41	0.1	8.7	-41	33
Placebo Group Non-Estate Private Acts										
(e) Marriage	No	All	1.6	2.0	0	10	0.1	2.2	-9	7
(f) Naturalization	No	All	7.2	6.3	0	36	0.0	7.2	-29	22
(g) Office	No	All	0.4	0.9	0	7	0.0	1.2	-6	7
(h) Sum (Marriage, Naturalization, Office)	No	All	9.1	7.6	0	46	0.1	8.7	-34	25

Notes: Column (1) indicates acts that changed rights to land and resources, marked “All” for acts that did and “no” for acts that did not. Column (2) indicates acts that altered personal rights, marked “All” for acts that did, and “some” if the act sometimes affected personal rights. Columns (3) through (6) describe the statistical properties of the original series. Columns (7) through (10) describe the statistical properties of the series in differences, i.e. where the observation in year t-1 is subtracted from the observation in year t. Columns (3) and (7) indicate the average. Columns (4) and (8) indicate the standard deviation. Columns (5) and (9) indicate the minimum value. Columns (6) and (10) indicate the maximum value.

Table 2: Statutory Authority and Finance Acts, Summary Statistics

		$\Delta$ Rights To Land (1)	Provide I & S (2)	Series in levels				Series in differences					
				Avg (3)	SD (4)	Min (5)	Max (6)	Stat? (7)	Avg (8)	SD (9)	Min (10)	Max (11)	Stat? (12)
Statutory Authority Acts													
(a)	All	All	All	46.1	42	0	187	No	0.9	15.9	-53	45	Yes
(b)	Transportation Only	All	All	33.7	29.8	0	126	No	0.8	11.3	-37	32	Yes
(c)	Urban Only	All	All	9	10.5	0	53	Yes	0.1	6.6	-22	26	Yes
Placebo Group													
(d)	Govt. Finance Acts	None	Some	22.7	22.3	0	94	Yes	0.2	15.8	-87	54	Yes

Notes: Column (1) indicates acts that changed rights to land and resources, marked “All” for acts that did and “none” for acts that did not. Column (2) indicates whether the acts authorized the provision of infrastructure or services, marked “All” for acts that did and “some” for categories in which some acts authorized infrastructure and services. Columns (3) through (7) describe the statistical properties of the original series. Columns (8) through (12) describe the statistical properties of the series in differences, i.e. where the observation in year t-1 is subtracted from the observation in year t. Columns (3) and (8) indicate the average. Columns (4) and (9) indicate the standard deviation. Columns (5) and (10) indicate the minimum value. Columns (6) and (11) indicate the maximum value. Columns (7) and (12) indicate whether the series is stationary, indicated “yes,” or whether the series is non-stationary, indicated “no.” An augmented Dickey-Fuller test is used to determine whether the series possesses a unit root.

Table 3: Enclosure Acts and Amendments, Summary Statistics

		$\Delta$ Rights To Land	Correct Error	Series in levels				Series in differences					
				Avg	SD	Min	Max	Stat?	Avg	SD	Min	Max	Stat?
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(a)	Enclosure Acts	All	None	27.4	35.7	0	135	No	0.6	12.7	-50	37	Yes
(b)	Enclosure Amendments	Some	All	0.2	0.7	0	5	Yes	0	0.7	-3	5	Yes

Notes: Column (1) indicates acts that changed rights to land and resources, marked “all” for acts that did and “some” for categories in which some acts changed rights to land and resources while other acts did not. Column (2) indicates whether the acts amended or corrected earlier acts changing rights to land and resources, marked “all” for acts that did and “none” for acts that did not. Columns (3) through (7) describe the statistical properties of the original series. Columns (8) through (12) describe the statistical properties of the series in differences, i.e. where the observation in year t-1 is subtracted from the observation in year t. Columns (3) and (8) indicate the average. Columns (4) and (9) indicate the standard deviation. Columns (5) and (10) indicate the minimum value. Columns (6) and (11) indicate the maximum value. Columns (7) and (12) indicate whether the series is stationary, indicated “yes,” or whether the series is non-stationary, indicated “no.” An augmented Dickey-Fuller test is used to determine whether the series possesses a unit root.

Table 4: Economic and Political Explanatory Variables, Summary Statistics

		Series in Differences				Description	Sources
		Avg	SD	Min	Max		
		(1)	(2)	(3)	(4)	(5)	(6)
(a)	Interest Rate, Real	-0.1	4.9	-15.1	12.9	Yield on 2½ % consols minus inflation.	Neal (1990) and Clark (2001)
(b)	Foreign Trade, Volume	0.7	4.5	-24.2	18.3	Sum exports plus imports at official prices.	Mitchell (1988)
(c)	Election Year	0	0.6	-1	1	Indicator for years with elections.	H.HS (1993) and Evans (2001)
(d)	Monarch Dies	0	0.3	-1	1	Indicator for years in which monarch dies.	H.HS (1993) and Evans (2001)
(e)	Prime Minister Changes	0	0.5	-1	1	Indicator for years in which PM changes.	H.HS (1993) and Evans (2001)
(f)	Epidemic Mortality	0	0.3	-1	1	Indicator for years with epidemic mortality.	H.HS (1993) and Evans (2001)
(g)	Land Tax Rate, Real	0	0.6	-2	4	Tax rate in shillings per acre.	H.HS (1993) and Evans (2001)
(h)	Tax Code Change	0	0.1	-1	1	Indicator for year when tax code changes.	H.HS (1993) and Evans (2001)
(i)	Tree Ring Growth	3.3	178.5	-468	496	Index. 0 equals no growth. 1000 is average.	Baillie (1986)
(j)	War Years	0	0.3	-1	1	Indicator for years when Britain fights wars.	Rodger (2004), H.HS (1993), and Evans (2001)

Notes: Definitions for Columns (1) through (4) identical to definitions for Columns (8) through (11) in Table 3. All of these differenced series are stationary. H.HS (1993) refers to the texts by Holmes (1993) and Holmes and Szechi (1993).

Table 5: Estate Acts, 1705-1830, Regression Results

	$\Delta$ Estate Acts				$\Delta$ Non-Estate Private Acts				
	Sales + Leases (1)	Sales + Leases (2)	Sales + Leases (3)	Sales + Leases (4)	Marriage (5)	Naturalize (6)	Office (7)	All (8)	All (9)
$\Delta$ Real interest rate t-1	-0.22 [0.11]			-0.11 [0.14]					-0.21 [0.35]
$\Delta$ Real interest rate t-2		<b>-0.34</b> [0.11]	<b>-0.34</b> [0.13]	<b>-0.35</b> [0.13]	-0.02 [0.04]	0.14 [0.17]	0.02 [0.02]	-0.08 [0.23]	0.14 [0.26]
$\Delta$ Trade t-1	-0.03 [0.12]			-0.21 [0.14]					-0.01 [0.15]
$\Delta$ Trade t-2		-0.09 [0.17]	-0.05 [0.18]	-0.08 [0.18]	0.08 [0.07]	-0.11 [0.19]	-0.004 [0.01]	0.12 [0.22]	0.02 [0.26]
Control Variables?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
#Observations	124	124	124	124	124	124	124	124	124
F-test (deg. freedom)	(2,113)	(2,113)	(10,105)	(12,103)	(10,105)	(10,105)	(10,105)	(10,105)	(12,103)
F-test statistic	301	339	276	6228	46	31	1274	124	117
Sum coefficients on $\Delta$ real interest rate t-1 and t-2 (p-value)				<b>-0.51</b> (0.002)					-0.07 (0.57)
Sum coefficients on $\Delta$ trade t-1 and t-2 (p-value)				-0.28 (0.30)					0.14 (0.72)

Notes: **Bold face** indicates significant at the 5% level. *Italic* indicates significance at the 10% level. Standard errors calculated using the Newey-West procedure with 3 lags. Control variables include year of election, monarch dies, prime minister changes, epidemic mortality, land tax rate real, tax code change, tree ring growth, and war years.

Table 6: Estate Acts, 1765-1830, Regression Results

	$\Delta$ Estate Acts					$\Delta$ Non-Estate Private Acts				
	Sales + Leases (1)	Sales + Leases (2)	Sales + Leases (3)	Sales (4)	Leases (5)	Marriage (6)	Naturalize (7)	Office (8)	All (9)	All (10)
$\Delta$ Real interest rate t-1	-0.22 [0.11]		-0.21 [0.17]	-0.05 [0.13]	-0.16 [0.12]					-0.08 [0.64]
$\Delta$ Real interest rate t-2		<b>-0.34</b> [0.18]	<b>-0.50</b> [0.14]	<b>-0.35</b> [0.13]	<b>-0.15</b> [0.07]	-0.07 [0.08]	-0.07 [0.38]	0.00 [0.03]	-0.21 [0.47]	0.35 [0.44]
$\Delta$ Trade t-1	-0.03 [0.12]		<b>-0.29</b> [0.14]	-0.13 [0.11]	<b>-0.16</b> [0.06]					0.19 [0.17]
$\Delta$ Trade t-2		-0.01 [0.14]	-0.02 [0.13]	-0.12 [0.13]	<b>0.10</b> [0.04]	<i>0.13</i> [0.06]	0.06 [0.17]	0.00 [0.01]	0.04 [0.24]	-0.05 [0.29]
Control Variables?	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
#Observations	66	66	66	66	66	66	66	66	66	66
F-test (deg. freedom)	(2,64)	(10,56)	(10,56)	(12,54)	(12,54)	(10,56)	(10,56)	(10,56)	(10,56)	(12,54)
F-test statistic	3	8	8	2	8	21	93	1	5	5
Sum coefficients on $\Delta$ real interest rate t-1 and t-2 (p-value)			<b>-0.72</b> (0.001)	<b>-0.40</b> (0.01)	<b>-0.32</b> (0.04)					0.27 (0.57)
Sum coefficients on $\Delta$ trade t-1 and t-2 (p-value)			-0.30 (0.21)	-0.25 (0.24)	-0.06 (0.54)					0.14 (0.72)

Notes: **Bold face** indicates significant at the 5% level. *Italic* indicates significance at the 10% level. Standard errors calculated using the Newey-West procedure with 3 lags. Control variables include year of election, monarch dies, prime minister changes, epidemic mortality, land tax rate real, tax code change, tree ring growth, and war years.

Table 7: Statutory Authority Acts Regression Results

	$\Delta$ Statutory Authority Acts							$\Delta$ Finance
	All (1)	All (2)	All (3)	All (4)	Transport (5)	Urban (6)	All (7)	(8)
$\Delta$ Real interest rate t-1	<b>-1.00</b> [0.33]	<b>-1.07</b> [0.33]	<b>-1.00</b> [0.35]	<i>-1.13</i> [0.59]	<b>-0.54</b> [0.21]	<b>-0.33</b> [0.14]	<b>-0.91</b> [0.28]	0.29 [0.35]
$\Delta$ Real interest rate t-2			-0.20 [0.33]					
$\Delta$ Trade t-1	<b>1.03</b> [0.36]	<b>1.05</b> [0.33]	<b>1.01</b> [0.35]	<b>1.03</b> [0.38]	<b>0.58</b> [0.24]	<b>0.37</b> [0.12]	<b>1.11</b> [0.42]	0.18 [0.40]
$\Delta$ Trade t-2			-0.02 [0.30]					
Control variables?	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# Observations	124	124	124	66	124	124	120	120
F-test (deg freedom)	(2,113)	(10,105)	(10,105)	(10,56)	(10,105)	(10,105)	(10,101)	(10,101)
F-test statistic	88	8519	33	10	4015	1227	7593	11
Sum coefficients on $\Delta$ real interest rate t-1 and t-2 (p-value)			<b>-1.20</b> (0.001)					
Sum coefficients on $\Delta$ trade t-1 and t-2 (p-value)			0.98 (0.08)					

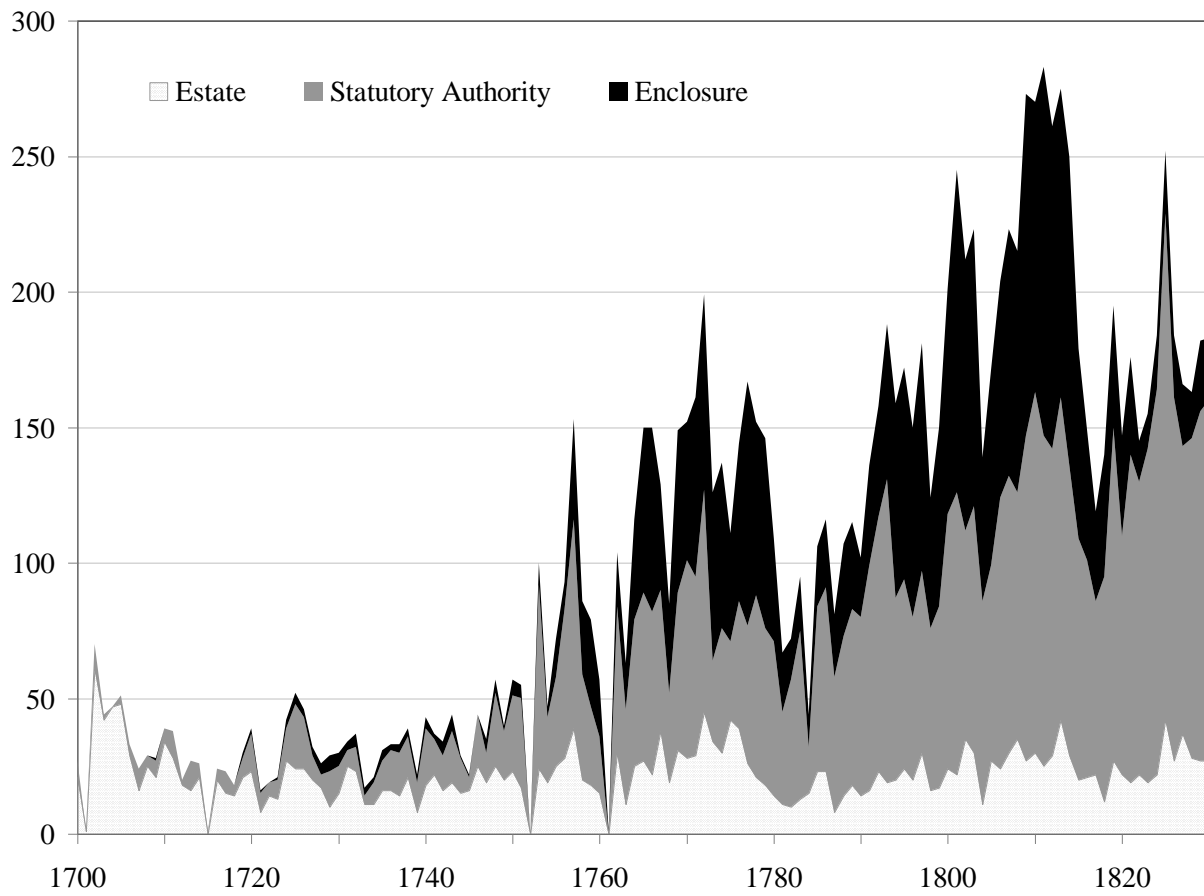
Notes: **Bold face** indicates significant at the 5% level. *Italic* indicates significance at the 10% level. Standard errors calculated using the Newey-West procedure with 2 lags. Control variables include years of election, monarch dies, prime minister changes, epidemic mortality, land tax rate real, tax code change, tree ring growth, and war.

Table 8: Enclosure Acts Regression Results

	$\Delta$ Enclosure Acts			$\Delta$ Amendments
	(1)	(2)	(3)	(4)
$\Delta$ Real interest rate t-1	<b>-1.04</b> [0.28]	-0.67 [0.43]	-0.43 [0.42]	0.03 [0.03]
$\Delta$ Real interest rate t-2			<b>-0.94</b> [0.41]	
$\Delta$ Trade t-1	0.47 [0.32]	<i>0.64</i> [0.36]	0.44 [0.33]	-0.05 [0.04]
$\Delta$ Trade t-2			0.10 [0.35]	
Control variables?	No	Yes	Yes	Yes
# Observations	66	66	66	66
F-test (deg freedom)	(2,64)	(9,57)	(11,55)	(9,57)
F-test statistic	11	5	4	3
Sum coefficients on $\Delta$ real interest rate t-1 and t-2 (p-value)			<b>-1.37</b> (0.02)	
Sum coefficients on $\Delta$ trade t-1 and t-2 (p-value)			0.54 (0.34)	

**Bold face** indicates significant at the 5% level. *Italic* indicates significance at the 10% level. Standard errors calculated using the Newey-West procedure with 2 lags. Control variables include years of election, monarch dies, prime minister changes, epidemic mortality, land tax rate real, tax code change, tree ring growth, and war years.

Figure 1: Number of Acts Reorganizing Property Rights, 1700 to 1830.



Sources: see text.

Figure 2: Relationship Between Real Interest Rate, Estate Acts, and Placebo Group

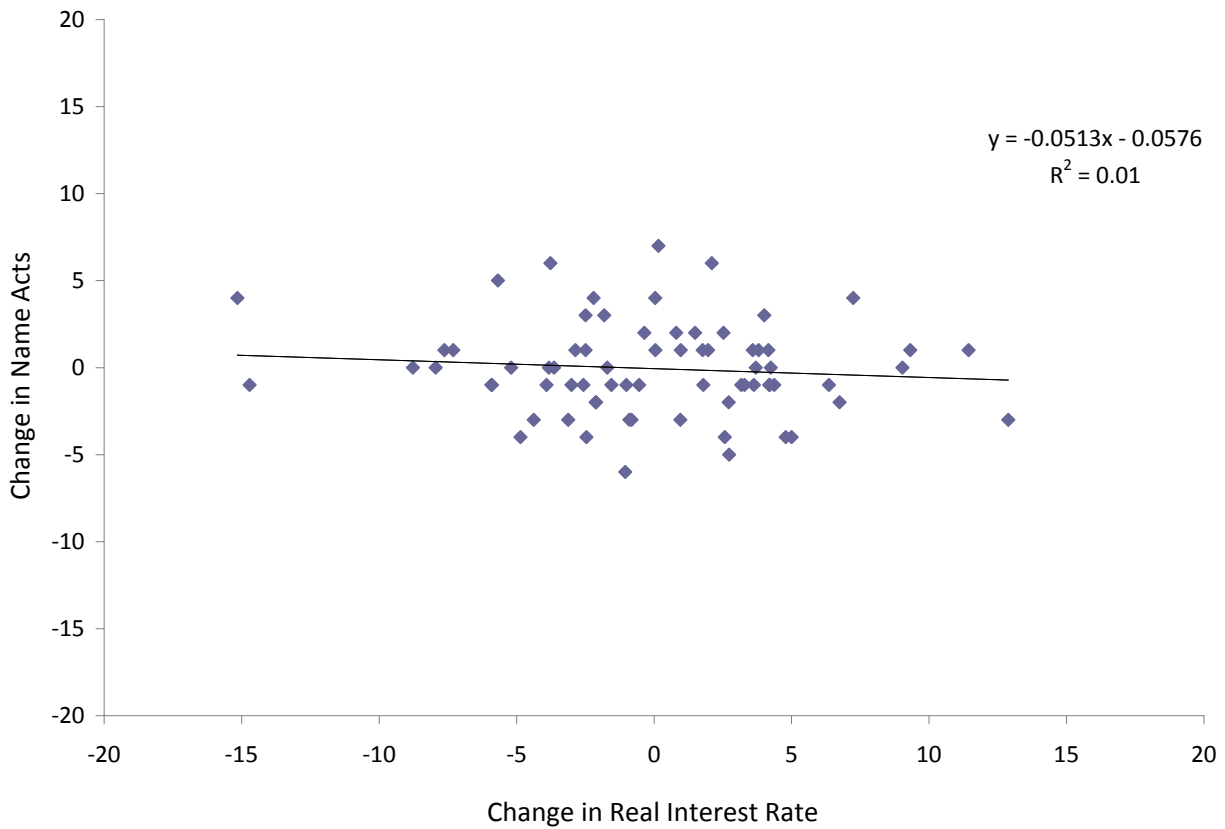
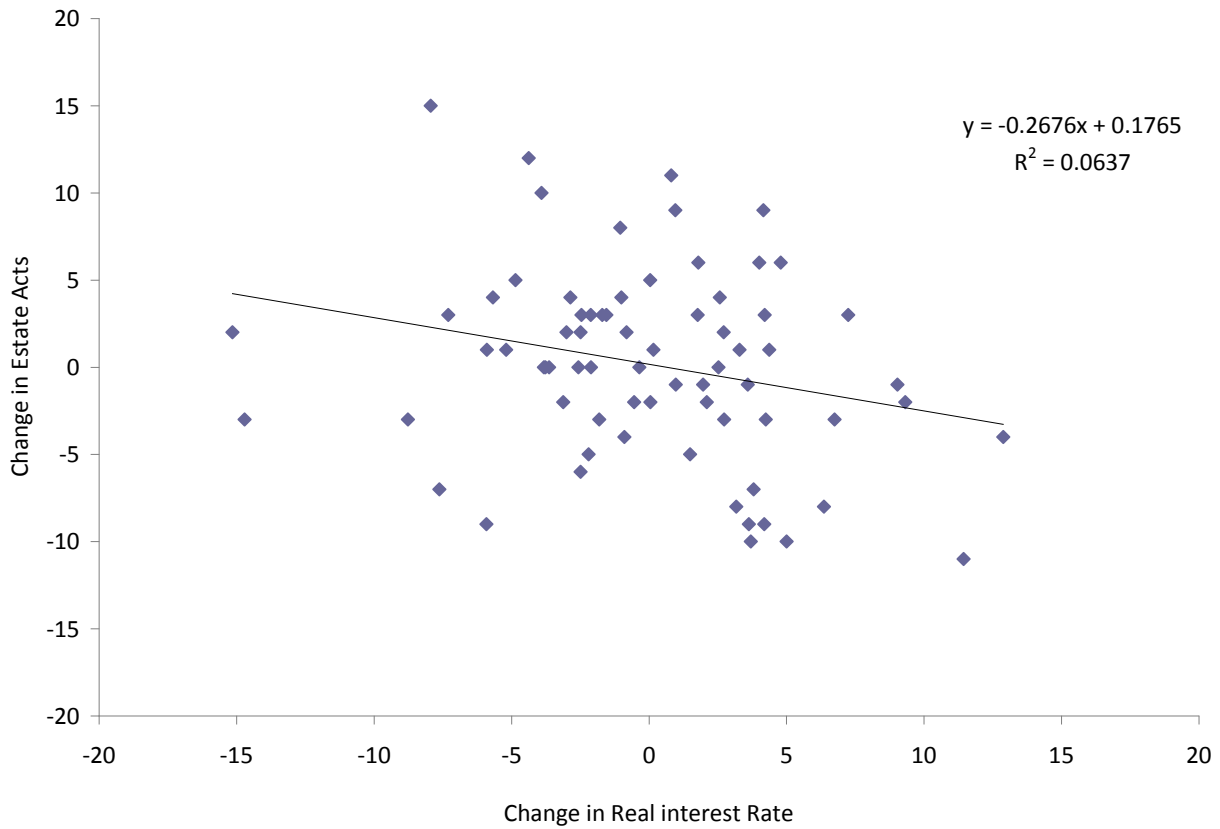


Figure 3: Relationship Between Real Interest Rate, Statutory Authority Acts, and Placebo Group

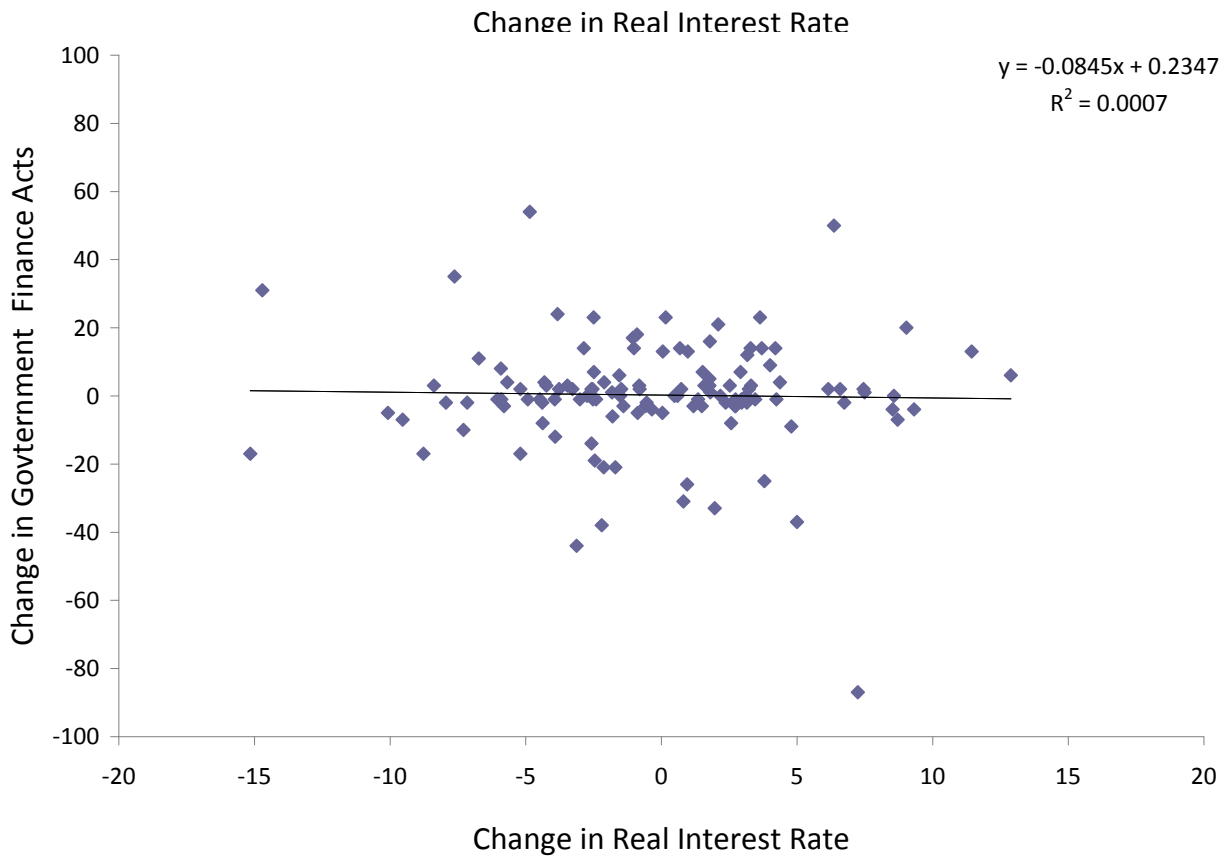
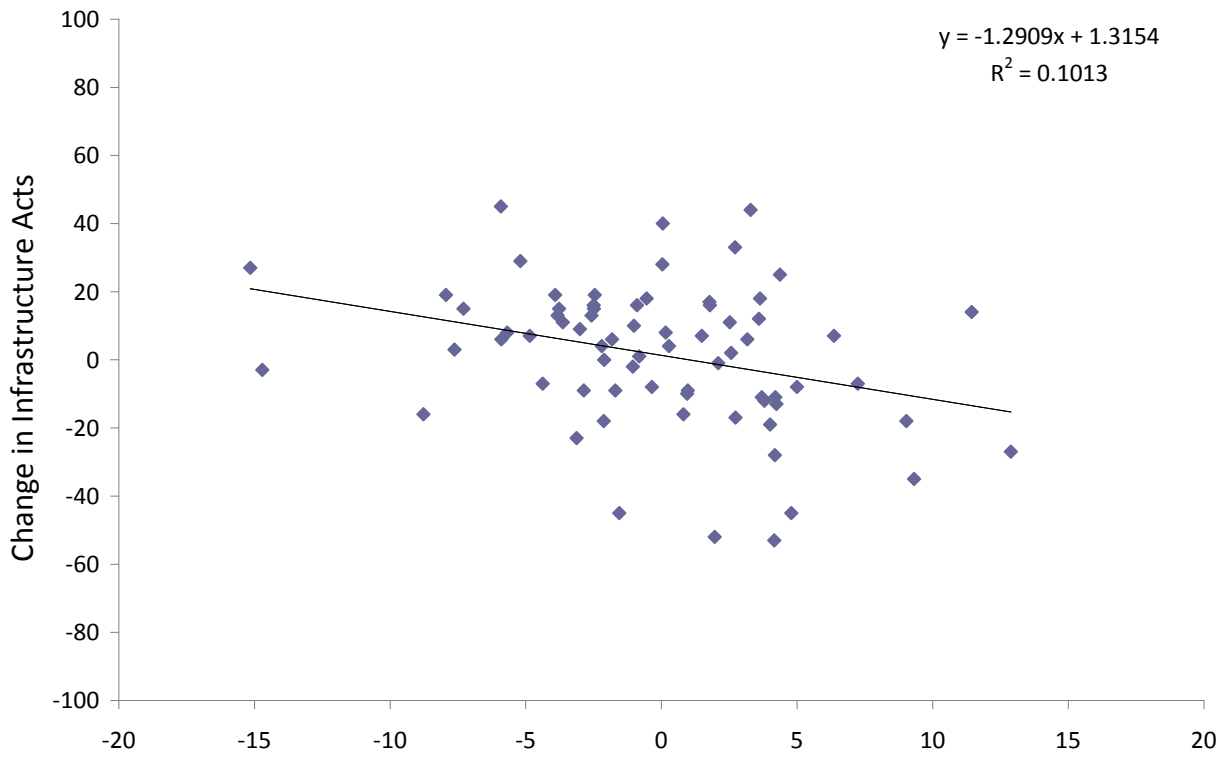


Figure 4: Relationship Between Real Interest Rate, Enclosure Acts, and Placebo Group

