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# Property Rights and Parliament in Industrializing Britain

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## Abstract

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. Parliament's efforts to adapt property rights to modern economic conditions may have accelerated Britain's economic ascent.

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

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of their barbarous ancestors. [Thomas Jefferson, letter to Samuel Kercheval, July 12, 1816]<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 toward lighthouses. A large literature follows Coase's lead and describes the common law's role in regulating property rights, particularly rights to real estates, but little scholarship discusses Parliament's influence over rights to land and resources.

Recent research addresses that lacuna in the literature (Bogart and Richardson 2009, 2010). Parliament played a pivotal role in the evolution of equitable estates, a property right superimposed above real estates and dictating who received revenues arising from land and resources. This essay extends that insight to the spectrum of legal arrangements regulating the cultivation of land, the utilization of resources, and investment in infrastructure.

Addressing these issues requires understanding property rights in preindustrial Britain. Britain's preindustrial property rights regime posed problems for people trying to reallocate resources toward 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 transfer property only 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 preindustrial 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 holdouts, 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 rights regime, which valued tradition and stability above innovation and flexibility.

<sup>1</sup> This quote is inscribed on the southeastern interior wall of the Jefferson Memorial in Washington, D.C.

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, which was enshrined 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 toward new uses.

A key question concerning Parliament's role in the property system is whether Parliament supplied legislation that reorganized property rights elastically, in the sense that when the public's demand for legislation expanded, the quantity of legislation rose in response while the cost remained reasonable and stable. Or did Parliament supply legislation inelastically, which would indicate that the political system dictated the pace of reform, perhaps because of desires to extract economic rents, protect social classes, or restrain change?

This essay demonstrates that Parliament supplied property rights elastically, beginning with evidence describing Parliament's procedures for reorganizing rights. The evidence indicates that Parliament's process was rapid, affordable, and consensual. The demonstration continues with a series of statistical tests that compare the annual number of acts that reorganized property rights with variables that influenced the public's desire to reorganize rights and Parliament's willingness to supply the requisite legislation. The public's demand depended on the costs and benefits of reorganizing rights. The benefits of reorganization depended on returns to constructing infrastructure, which varied with the cost of investment and the health of the economy. A good proxy for the former is the *ex post* real interest rate, and a good proxy for the latter is the volume of international trade.

Our statistical tests regress changes in the annual number of acts reorganizing property rights on changes in the volume of trade, the real interest rate, and an array of additional variables that influenced the public's desire to reorganize

rights and Parliament's ability to pass the requisite legislation. Coefficients recovered from these regressions reflect short-term changes in legislative output caused by fluctuations in factors influencing the demand for reorganization and the supply of legislation. These regressions also account for econometric issues—such as nonstationarity and heterogeneity—that complicate the process of drawing inferences from time-series data. Additional robustness checks, including placebo groups and instrumental variables, allow clear conclusions to be drawn from the correlations in the data. The placebo groups consist of acts that were processed using the same procedures as acts reorganizing property rights but that did not alter rights to land and resources. The instrumental variables consist of climatic conditions conducive to crop cultivation—as recorded in the width of tree rings—for Great Britain and its principal trading partners. These instrumental variables clearly demonstrate the direction of causation.

The rest of this essay elucidates our endeavor. Section 2 provides details about Parliament's process for reorganizing rights to land and resources. Section 3 describes the quantitative evidence that we analyze. Section 4 describes our statistical methods. Section 5 presents empirical results. Section 6 discusses the implications of our analysis. 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's actions enabled Britain to reorganize property rights gradually and peacefully during the century following the Glorious Revolution.

Understanding Parliament's role in the property rights system addresses the larger issue of why Britain was first to industrialize. Some scholars have emphasized Parliament's role in restraining the Crown and its implications for the security of property rights (North and Weingast 1989). Others have emphasized the impact of Enlightenment ideas in eroding rent-seeking policies (Mokyr and Nye 2007). Our analysis is unique because it shows how Parliament changed property rights in an enlightened manner. Similar large-scale changes did not occur on the European continent until the nineteenth and twentieth centuries, following shocks to society such as the French and Russian revolutions.

## 2. Acts That Reorganized Rights to Land and Resources

This section describes estate, statutory authority, and enclosure acts and Parliament's procedures for passing them. These three types of acts had 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.

### 2.1. *Estate 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 holders' 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. "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).

Three features of settlements generated a need for parliamentary involvement. First, without an act of Parliament, holders of settled estates could change the terms of the settlement only when their heirs came of age (reached the age of 21). Then the holder and the 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. 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.

Third, 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 mortgages could be taken out, leases drawn up, or sales completed, 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 (Bogart and Richardson 2009).

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

## 2.2. *Statutory Authority Acts*

Statutory authority acts fostered the construction, improvement, and maintenance of infrastructure and social services. They 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.<sup>2</sup>

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 could 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 nonprofit organizations whose trustees served without remuneration or for-profit corporations whose directors purchased shares and profited from their investments. To these new organiza-

<sup>2</sup> The history of statutory authorities has been documented by several scholars. For a sample of works, see Webb and Webb (1963), Willan (1964), Albert (1972), Handley (1990), Innes (1998), and Bogart (2005).

tions, 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 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 toll revenues.

Acts gave statutory authorities the right to purchase land along a route's right-of-way and established legal procedures for doing so. Organizations initially negotiated with landowners. If the parties could not agree on a price for a plot of land, the organization could appeal to a commission that could compel the landowner to sell at a price that a jury and commission determined to be fair and reasonable. These procedures provided the legal origin for modern laws concerning eminent domain.

### 2.3. *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 large open fields that served as 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 particular plots scattered throughout the fields and intermingled with those of their neighbors. Villagers managed collective assets, such as the open arable fields, through village institutions, including customary laws and manorial courts.

The problems of open fields have long been studied by scholars.<sup>3</sup> Collective decision making and communal rights impeded investments in improvements, the adoption of new techniques, and the conversion of land to new uses. Scattered plots wasted time and resources. Common pastures encouraged overgrazing 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 with 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

<sup>3</sup> For a sample of works, see Tate (1967, 1978), Turner (1984), Wordie (1983), Allen (1992), Clark (2001a), and Richardson (2005).

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.

#### *2.4. The Process of Passing Acts*

The passage of estate, statutory authority, and enclosure acts required time, resources, and expertise. Individuals and communities had to organize and submit proposals. Legislators had to review proposals and counterproposals from opposing interests. Clerks had to inscribe acts on parchment and ensure that they contained language enforceable in courts.

Procedures for passing estate, statutory authority, and enclosure acts were standardized in the early 1700s and operated with minor adjustments through the late nineteenth century (Clifford 1968; Williams 1948). An estate act began with a petition from an individual or family desiring to change the rules regarding its estate. A statutory authority act also began with a petition, usually from a community stating a problem, such as insufficient road capacity, or an entrepreneur proposing a project, such as a canal or railway. An enclosure act began with a series of public meetings during which residents of a village debated the issue and drafted a petition signed by a sufficient share (typically four-fifths) of those possessing rights to the property under consideration.

Petitions could be submitted to either house of Parliament. A Parliamentary committee investigated the merits of a 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 was standard practice to let any peer participate if he desired to do so. If the committee deemed a petition appropriate, the petition became a bill that was read at least three times to the entire chamber and publicly disseminated, ensuring that all interested individuals learned of the legislation. During the readings and subsequent committee meetings, members could suggest amendments and pertinent parties could submit counterproposals. After the initial house approved the bill, it was sent to the other house, where it once again underwent public review. After it passed both houses, Parliament submitted the bill for royal assent. Then the bill became law.

Repeated 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 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, smallholders, 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 could air their grievances if called as witnesses by the committee. Opponents could also submit counterpetitions that amended the original legislation or offered alternative proposals. Some bills aroused so much opposition that they failed to become acts. Others became law, but only after amendments appeased opposition.

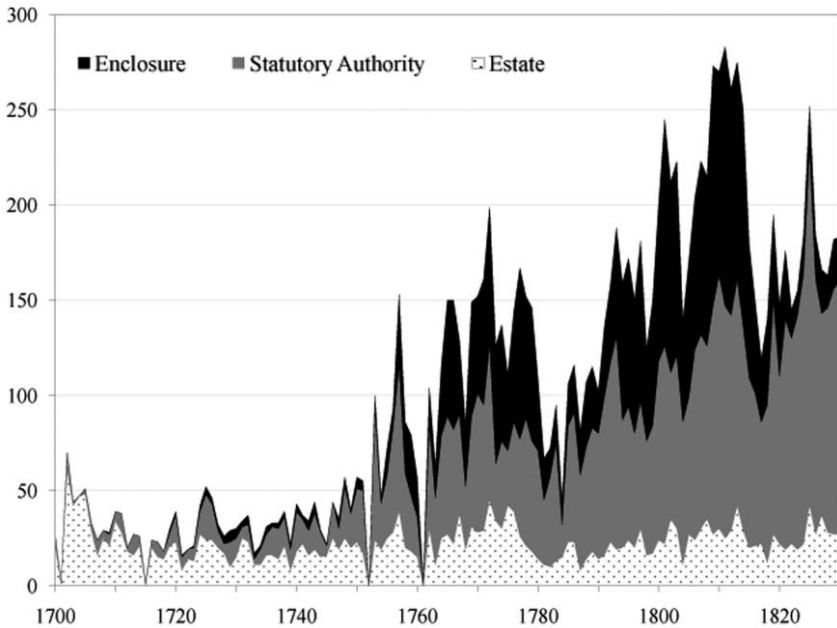
The cost of proposing and opposing legislation appears to have been moderate and stable. Petitioners paid fees to the clerks of Parliament and officers of the Houses of Commons and Lords. Standing orders dictated the schedule of fees (Clifford 1968, pp. 716–51). The fees increased for longer bills with 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 fees 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 1968, p. 741). Members of Parliament and peers received no direct compensation for introducing and advocating bills, but politicians may have been rewarded indirectly with electoral support, payments in kind, patronage, or side payments. Petitioners also paid lawyers or parliamentary agents to prepare the paperwork and guide their bills through Parliament. Agents presented arguments, gathered evidence, and prepared witnesses for committee proceedings. Agents’ fees amounted to 50–80 percent of the cost of obtaining an act (Commons 1833, pp. 424–29).

The preponderance of material pertaining to petitions indicates that the process was accessible, affordable, and predictable. Whether the political process operated as advertised is, of course, a testable hypothesis. The subsequent sections of this essay describe the historical data and statistical methods needed to conduct such a test.

### 3. Data

The Parliamentary Archive maintains a computerized catalog, Portcullis, which indicates the clerical title, calendar year, regal year, and parliamentary session for all acts passed since the sixteenth century.<sup>4</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

<sup>4</sup> See Parliament’s Web site (Portcullis Catalogue Archive, <http://www.portcullis.parliament.uk>). The clerical titles in 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.



**Figure 1.** Number of acts reorganizing property rights, 1700–1830

to identify the act and its principal provisions amid 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, 2010).<sup>5</sup> 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 legislation 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.

Table 1 describes the series on estate acts, including the total number of estate acts passed each year and time series indicating the annual number of estate acts that authorized the sale or lease 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.

Table 1 also describes the data that serve as a comparison (or placebo) group for estate acts. Marriage acts permitted individuals to marry and/or divorce in

<sup>5</sup> Our quantitative compilation of acts builds on a large literature that counts and categorizes acts of Parliament. See Langford (1991), Hoppit (1996), and Innes (1998) for recent contributions.

Table 1  
Estate and Other Private Acts: Summary Statistics

Type of Act	Series in Levels				Series in Differences			
	Average	SD	Min	Max	Average	SD	Min	Max
Estate acts:								
All	21.7	8.4	0	45	-.2	9.6	-21	30
Authorized sales	11.2	5.0	0	29	-.1	5.7	-15	15
Authorized leases	3.7	3.1	0	24	.0	3.1	-12	16
Authorized sales or leases	14.8	6.8	0	39	-.1	7.2	-17	17
Nonstate private acts:								
Marriage	1.6	2.0	0	10	.1	2.2	-9	7
Naturalization	7.7	6.2	0	36	.0	6.9	-25	20
Office	.4	.7	0	4	.0	1.0	-4	3
Sum	12.1	7.9	0	47	.1	9.3	-34	26

**Note.** Estate acts changed rights to land and resources, while nonstate private acts did not. Personal rights were affected by some estate acts and by all nonstate private acts. For the series in differences, the observation in year  $t - 1$  is subtracted from the observation in year  $t$ .

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, and executive agencies and other positions that provided government-funded livings. Important similarities existed between these marriage, naturalization, and office acts (collectively called nonstate private acts) and the estate acts. When processing all of these acts, Parliament followed common procedures. Similarities also existed in the clientele that requested these acts. A key feature, however, distinguishes estate and nonstate 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.

Table 2 presents the numbers of statutory authority acts passed each year. The acts pertaining to transportation principally involve roads, canals, harbors, rivers, bridges, and railways. The acts pertaining to urban improvements principally involve 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. An augmented Dickey-Fuller test was used to indicate whether the series are stationary. While several series are nonstationary in levels, all of the series are stationary in differences.

The placebo group for statutory authority acts is government finance acts, which dealt with national government expenditure and taxation. Most pertained to excise, customs, and land taxes, the purchasing of ships, provisioning of military forces, and construction of 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

Table 2  
Statutory Authority and Finance Acts: Summary Statistics

	Series in Levels					Series in Differences				
	Average	SD	Min	Max	Stationary	Average	SD	Min	Max	Stationary
Statutory authority acts:										
All	50.8	41.4	0	187	No	1.0	19.4	-53	68	Yes
Transportation only	37.2	29.1	0	126	No	.7	14.3	-37	56	Yes
Urban only	9.8	10.8	0	53	Yes	.2	6.9	-22	26	Yes
Government finance acts	24.5	23.0	0	94	Yes	.2	16.5	-87	54	Yes

**Note.** All statutory authority acts changed rights to land and resources and authorized the provision of infrastructure or services. No government finance acts changed the rights to land or resources, but some authorized the provision of infrastructure or services. For the series in differences, the observation in year  $t - 1$  is subtracted from the observation in year  $t$ . The placebo group is government finance acts. An augmented Dickey-Fuller test is used to determine whether the series possesses a unit root.

dictates of foreign affairs and little on the costs and benefits of reorganizing rights to land and resources.

Table 3 describes enclosure acts. The placebo group is amendments to enclosure acts. Amendments provide an illuminating comparison because their passage followed procedures identical to those for initial enclosure acts, but demand for amendments arose primarily after random instances when errors crept into original legislation during the long process of drafting and passing bills.

The accuracy of the data depicted in Tables 1–3 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 month 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 1714–15, 1751–52, and 1760–61. 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 of 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.<sup>6</sup>

<sup>6</sup> We also correct for this by assigning acts to the years in which they appear to have been passed and by running all of our regressions only for the years 1763–1830, 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 3  
Enclosure Acts and Amendments: Summary Statistics

	Changed Rights to Land and Resources	Corrected Error	Series in Levels				Series in Differences					
			Average		SD		Min		Max		Stationary	
Enclosure acts	All	None	32.1	35.1	0	136	.2	13.8	-49	37	Yes	
Enclosure amendments	Some	All	.2	.7	0	5	0	1.1	-5	5	Yes	

**Note.** “Corrected error” indicates whether the acts amended or corrected earlier acts changing rights to land and resources. For the series in differences, the observation in year  $t - 1$  is subtracted from the observation in year  $t$ . An augmented Dickey-Fuller test is used to determine whether the series possesses a unit root.

Table 4 lists the right-hand-side variables in our regression analysis. The key explanatory variables are the real interest rate and the volume of foreign trade. The real interest rate determined the cost of investment and rate of intertemporal 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 consols) from Neal (1990), minus inflation, measured as a 3-year moving average of the percentage change in Clark's (2001b) consumer price index.<sup>7</sup> 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 toward more productive uses. The volume of trade also measures the health of the industrial and mercantile sectors relative to agriculture. Our measure of the volume of foreign trade, like that of most scholars, is the sum of the official values of imports and 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.

The indexes of climatic conditions are derived from timber growth rates. Tree rings reveal year-to-year fluctuations in conditions conducive to cultivation, which had large effects on trade patterns and interest rates in an economy dominated by agriculture.<sup>8</sup> Tree-ring indexes exist for Britain and several of its largest trading partners. A series from Belgium reveals climatic conditions in the Low Countries, the agricultural lands adjoining the North Sea and the English Channel, and the Rhine River basin. A series from the southern French Alps reflects climatic conditions in the Mediterranean basin, particularly the productive and densely populated regions along the Rhone River and in northern Italy. A series from Pomerania reflects climatic conditions in the grain-exporting regions in eastern Europe and near the Baltic Sea. Series from New York and Virginia reflect climatic conditions in England's American colonies, particularly the northern regions exporting foodstuffs, like fish and grain, and the southern colonies exporting cash crops, such as cotton and tobacco.

Graphing the data described in Tables 1–4 reveals correlations between the explanatory and dependent variables. A key correlation appears between changes in interest rates and changes in legislation reorganizing property rights. Figures 2–7 illustrate this correlation. Figures 2, 4, and 6 show that the number of acts increased when the interest rate fell, for estate acts, statutory authority acts, and enclosure acts, respectively. Figures 3, 5, and 7 show that this correlation did not exist for the placebo groups for each type of act. These patterns reveal a clear correlation between changes in the demand to reorganize property rights and changes in the number of reorganizations approved by Parliament. The next

<sup>7</sup> From 1700 to 1729, the dividend yield on Million Bank stock is used for the yield on long-term government bonds. See Neal (1990) and Global Financial Data (2010) for more discussion of UK interest rates in the early eighteenth century.

<sup>8</sup> See Mathias (1983) for a discussion of the role of climate in the British economy.

Table 4  
Explanatory Variables: Summary Statistics

	Series in Differences				Sources
	Average	SD	Min	Max	
Real interest rate	-.1	4.9	-15.1	12.9	Neal (1990); Clark (2001b)
Volume of foreign trade	738	4,665	-24,200	18,300	Mitchell (1988)
Election year	0	.6	-1	1	Holmes (1993); Holmes and Szechi (1993); Evans (2001)
Monarch died	0	.3	-1	1	Holmes (1993); Holmes and Szechi (1993); Evans (2001)
Prime minister changed	0	.5	-1	1	Holmes (1993); Holmes and Szechi (1993); Evans (2001)
Epidemic mortality	0	.3	-1	1	Holmes (1993); Holmes and Szechi (1993); Evans (2001)
Real land tax rate (shillings/acre)	0	.5	-2.1	2.0	Holmes (1993); Holmes and Szechi (1993); Evans (2001)
Tax code change	0	.1	-1	1	Holmes (1993); Holmes and Szechi (1993); Evans (2001)
War years	0	.3	-1	1	Rodger (2004); Holmes (1993); Holmes and Szechi (1993); Evans (2001)
Tree rings:					
Belgium	11.6	258.0	-1,040	1,190	Hoffsummer (1986)
England	2.5	177.1	-468	496	Baillie (1986)
French Alps	-4.0	282.0	-871	867	Tessier (1995)
Pomerania	.1	16.7	-63	61	Wazny (1995)
New York	1.45	187.4	-495	493	Cook (1995)
Virginia	1.4	196.2	-479	550	Cook (1994)

**Note.** The real interest rate is the yield on 2.5% consols minus inflation. The volume of foreign trade is calculated as the sum of exports plus imports at official prices. The values for tree rings are based on an index in which 0 indicates no growth and 1,000 is average. All of the differenced series are stationary.

section describes statistical methods that yield clear interpretations of these correlations.

#### 4. Methods

This section builds upon research that explores the public's demand and the political system's supply of property rights (Anderson and Hill 1975; Libecap 1989; Alston, Libecap, and Mueller 1999; Alston and Mueller 2004). Formalizing this intuition yields equations that can be estimated with clear interpretations and salutary statistical properties. This section explains what the estimating equation reveals about the patterns in the evidence.

The estimating equation is

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

where  $\Delta A_t$  is the change in the number of acts passed by Parliament from year  $t - 1$  to  $t$ ,  $\Delta x_{i,t-1}$  is the change from year  $t - 2$  to  $t - 1$  in the  $i$ th variable that affects returns from reorganizing property rights and thus shifts the demand for legislation,  $\alpha_i$  is the coefficient on the  $i$ th demand-shift variable,  $\Delta z_{j,t-1}$  is the change from  $t - 2$  to  $t - 1$  in the  $j$ th variable that alters Parliament's productivity and thus shifts the supply of legislation,  $\beta_j$  is the coefficient for the  $j$ th supply-shift variable, and  $\varepsilon_t$  is an error term. Explanatory variables are lagged to capture the time necessary to respond to changing circumstances, prepare petitions, debate bills, and pass acts.

This specification is derived from a standard supply and demand model applied to a market for reorganizing rights.<sup>9</sup> In such a model, the effect of a shift in demand depends on the elasticity of supply. If supply is inelastic, then shifts in demand have little (or no) impact on the equilibrium quantity but a large impact on the equilibrium price. As the elasticity of supply increases, shifts in demand have a larger impact on quantity and a smaller impact on price. The elasticity of supply is a key issue; it indicates Parliament's response to constituents' requests. If supply was elastic, then when constituents desired to reorganize property rights, Parliament allowed them to do so (as the documentary evidence indicates). If supply was inelastic, then Parliament based its decisions about reorganizing rights on concerns other than economic efficiency—concerns such as extracting economic rents, protecting social classes, or restraining modernization. In our model, determining the elasticity of supply involves the traditional hypothesis test for statistical significance of  $\alpha_i$ , the coefficients on the demand-shift variables  $\Delta x_{i,t-1}$ . If the null hypothesis that these coefficients equal zero can be rejected, then the supply curve cannot be perfectly inelastic. As the demand-

<sup>9</sup> See Bogart and Richardson (2008) for details on the model and the derivation of the estimating equation.

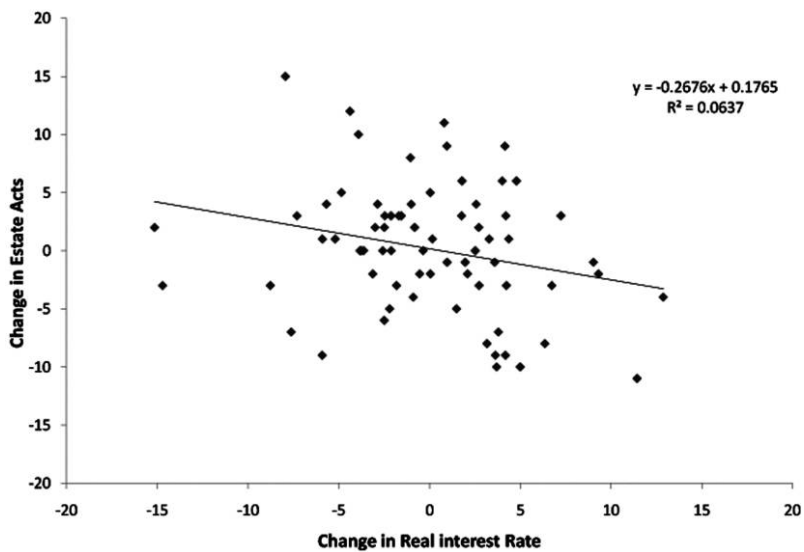


Figure 2. Relationship between real interest rate and estate acts

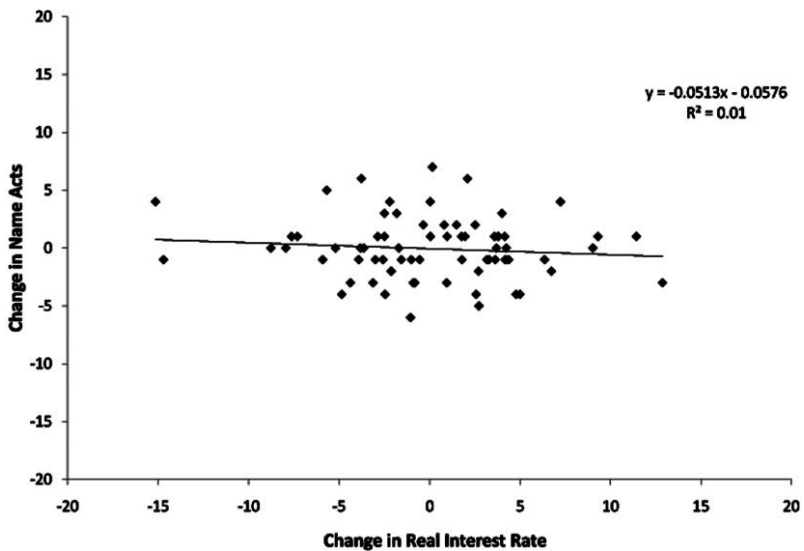


Figure 3. Relationship between real interest rate and placebo group for estate acts

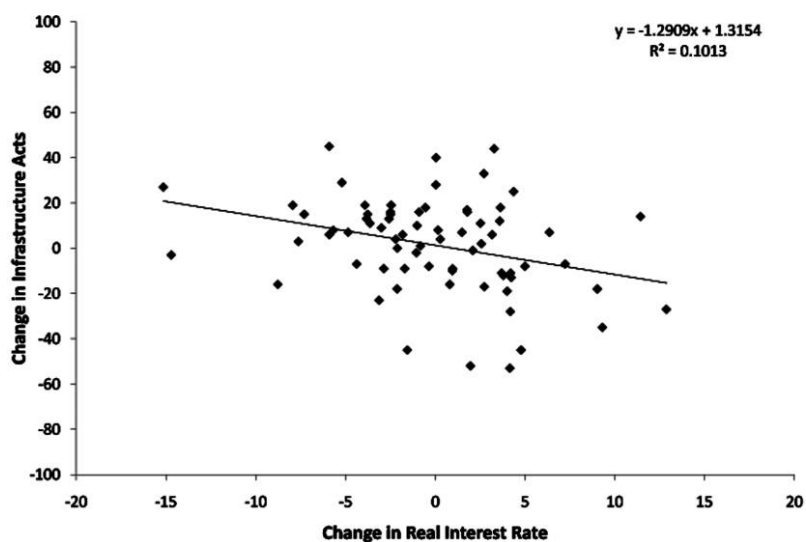


Figure 4. Relationship between real interest rate and statutory authority acts

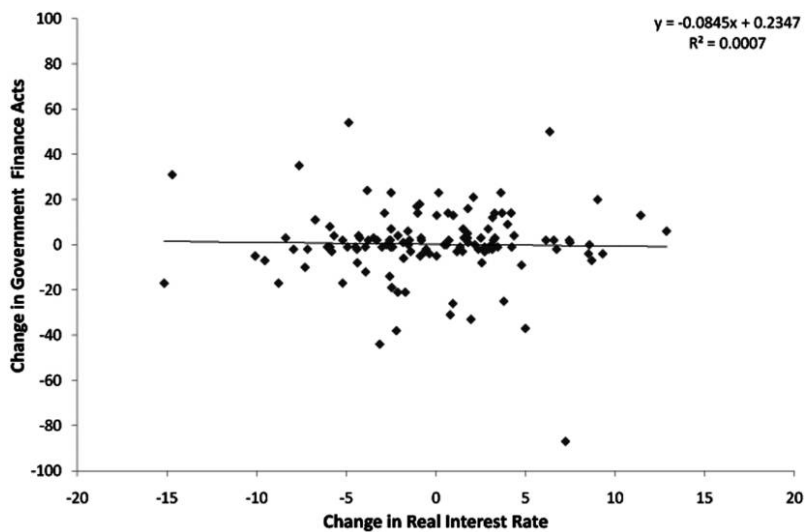


Figure 5. Relationship between real interest rate and placebo group for statutory authority acts.

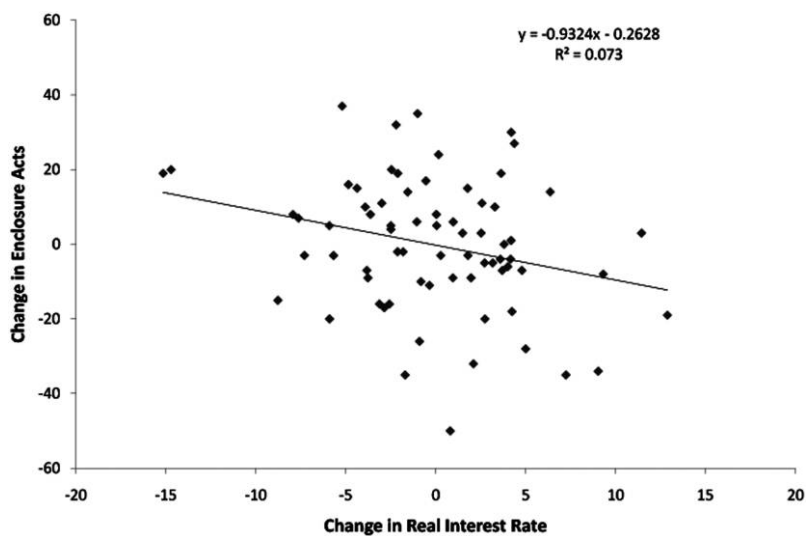


Figure 6. Relationship between real interest rate and enclosure acts

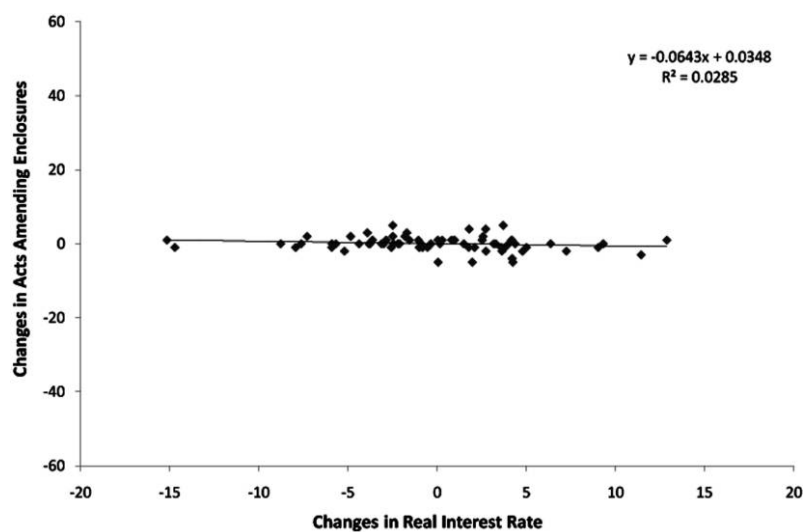


Figure 7. Relationship between real interest rate and placebo group for enclosure acts

shift coefficients  $\alpha_i$  increase relative to the supply-shift coefficients  $\beta_p$ , the elasticity of supply increases.

Analyzing changes (also known as first differences) in the data is sensible because this is the specification that arises from a supply and demand model. Analyzing differences is also necessary because much of the data that we analyze trends over time. Statistical phenomena frequently generate spurious correlations between trending time series. Analyzing differences ensures that the correlations we detect arose for real rather than statistical reasons.<sup>10</sup>

Our method also accounts for unobserved explanatory variables and the direction of causation. We control for unobserved explanatory variables using placebo groups. It is 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 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.

Our estimation method determines the direction of causation using instrumental variables. Our instruments are tree-ring measurements from Great Britain and its major trading partners. Tree-ring measurements reveal variations in climate conducive to cultivation that are obviously exogenous and highly correlated with the volume of commerce. When this instrument is used to identify the effects of trade on statutory authority acts in a standard two-stage least squares specification, the main results change little, which indicates that the regressions identify a causal link between short-run changes in economic conditions and property rights legislation.

## 5. Results

This section presents results from the methods described in the preceding section. Table 5 examines 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 regressions span the 124 years for which we have data suitable for statistical analysis. The initial year, 1705, lies close to the point at which 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 table explores the temporal relationship between the explanatory and dependent variables. Columns 1, 2, and 4 indicate that estate holders and Par-

<sup>10</sup> Our approach improves on earlier papers in the literature that link the level of real interest rates with the number of enclosure or statutory authority acts in given year (see Albert 1972; Crafts 1977).

Table 5  
Estate Acts, 1705–1830: Regression Results

	Δ Estate Acts Authorizing Sales and Leases				Δ Nonstate Private Acts				
	(1)	(2)	(3)	(4)	Marriage (5)	Naturalization (6)	Office (7)	All (8)	All (9)
Δ Real interest rate $t - 1$	-.22* (.11)			-.11 (.13)					-.28 (.32)
Δ Real interest rate $t - 2$		-.34* (.10)	-.39* (.11)	-.40* (.12)	-.03 (.04)	.11 (.17)	.02 (.02)	-.01 (.22)	.08 (.27)
Δ Trade $t - 1$	-.03 (.12)			-.22 (.14)					.01 (.14)
Δ Trade $t - 2$		-.09 (.17)	-.07 (.16)	-.10 (.16)	.04 (.08)	-.15 (.20)	-.01 (.01)	.09 (.28)	-.06 (.28)
Control variables	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-test statistic	313	360	528	2,945	19	53	13,378	149	162
Degrees of freedom	2, 113	2, 113	9, 106	11, 104	9, 106	9, 106	9, 106	9, 106	11, 104
Δ Real interest rate $t - 1 + \Delta$ real interest rate $t - 2$				-.51*					-.20
p-Value				.002					.37
Δ Trade $t - 1 + \Delta$ trade $t - 2$				-.32					-.05
p-Value				.23					.90

**Note.**  $N = 124$ . Standard errors are calculated using the Newey-West procedure with three lags. Control variables include year of election, death of a monarch, change in prime minister, epidemic mortality, real land tax rate, change in tax code, and war years.

\* Significant at the 5% level.

liament reacted to the changes in the real rate of interest over a period of 2 years, with the second lag being larger. Adding control variables in columns 3 and 4 improves the fit of the regression but does 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 2 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. Granger causality tests indicate that changes in economic conditions precede changes in legislative outcomes, while changes in legislative outcomes do not precede changes in economic variables. In technical terms, changes in the real interest rate Granger cause changes in estate acts.<sup>11</sup>

Replacing the dependent variables with placebos, nonstate private acts, strengthens our results. The placebos resembled estate acts in many dimensions but did not alter property rights. In all of the placebo tests, the dependent variable is uncorrelated with the real interest rate. This result has two important implications. First, 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 nonstate private acts. Second, excluded explanatory variables do not drive the results for the estate acts. If they did, then the same patterns should appear for the placebos.

Table 6 replicates these results for the years 1763–1830, 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 1–3 and 6–10 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. Columns 1–4 regress the change in the number of statutory authority acts on changes in the real interest rate and the volume of trade, with various sets of controls and lags. Column 5 restricts the analysis to statutory authorities dealing with transportation. Column

<sup>11</sup> The Granger causality tests are based on a vector autoregression (VAR) model with equations for the number of acts, the real interest rate, and the volume of trade. The equations include three lags of each endogenous variable. All test statistics, such as the likelihood ratio statistic, indicate that the lag length should be 3. The *p*-value for the chi-square statistic on changes in the real interest rate is less than .01, which indicates strong statistical significance. The VAR model also reveals that changes in sale and lease acts do not Granger cause changes in trade or real interest rates (the *p*-values are .86 and .14, respectively). Variation in acts is correlated with lags but not leads of our explanatory variables.

Table 6  
Estate Acts, 1765–1830: Regression Results

	Δ Estate Acts				Δ Nonstate Private Acts				
	Sales and Leases (1)	Sales and Leases (2)	Sales and Leases (3)	Sales (4)	Leases (5)	Marriage Naturalization (6)	Office (7)	All (8)	All (9)
Δ Real interest rate $t - 1$	-.32* (.13)		-.21* (.12)	-.02 (.09)	-.19* (.11)				-.46 (.50)
Δ Real interest rate $t - 2$		-.39* (.17)	-.43* (.16)	-.34* (.14)	-.09 (.08)	-.06 (.08)	-.01 (.38)	.01 (.03)	-.12 (.48)
Δ Trade $t - 1$	-.05 (.12)		-.29* (.14)	-.14 (.11)	-.15* (.06)				.07 (.15)
Δ Trade $t - 2$		-.02 (.13)	-.06 (.12)	-.15 (.11)	.09* (.04)	.03 (.08)	-.20 (.22)	.00 (.01)	-.18 (.31)
Control variables	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-test statistic	3	7	8	3	5	3	2	1	2
Degrees of freedom	2, 64	9, 57	11, 55	11, 55	11, 55	9, 57	9, 57	9, 57	11, 55
Δ Real interest rate $t - 1 + \Delta$ real interest rate $t - 2$									
p-Value			-.64*	-.36*	-.28*				-.41
Δ Trade $t - 1 + \Delta$ trade $t - 2$			.003	.01	.06				.23
p-Value			-.35	-.29	-.06				-.06
			.15	.16	.48				.88

Note.  $N = 66$ . Standard errors are calculated using the Newey–West procedure with three lags. Control variables include year of election, death of a monarch, change in prime minister, epidemic mortality, real land tax rate, change in tax code, and war years.

\* Significant at the 10% level.

\* Significant at the 5% level.

Table 7  
Statutory Authority Acts Regression Results

	$\Delta$ Statutory Authority Acts							$\Delta$ Finance Acts
	All (1)	All (2)	All (3)	All (4)	Transport (5)	Urban (6)	All (7)	(8)
$\Delta$ Real interest rate $t - 1$	-1.00* (.33)	-1.03* (.31)	-1.00* (.34)	-1.20* (.45)	-.56* (.20)	-.27+ (.14)	-.87* (.26)	-.03 (.33)
$\Delta$ Real interest rate $t - 2$			-.14 (.35)					
$\Delta$ Trade $t - 1$	1.03* (.36)	1.03* (.31)	1.01* (.35)	1.12* (.34)	.58* (.24)	.37* (.11)	1.08* (.39)	.64 (.53)
$\Delta$ Trade $t - 2$			-.02 (.32)					
Control variables	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$N$	124	124	124	66	124	124	120	120
$F$ -test statistic	117	169	1,237	8	255	482	169	26
Degrees of freedom	2, 113	9, 106	11, 104	9, 57	9, 106	9, 106	9, 102	9, 102
$\Delta$ Real interest rate $t - 1 + \Delta$ real interest rate $t - 2$			-1.14* .001					
$p$ -Value			.99+					
$\Delta$ Trade $t - 1 + \Delta$ trade $t - 2$			.10					
$p$ -Value								

**Note.** Standard errors are calculated using the Newey-West procedure with two lags. Control variables include years of election, death of a monarch, change in prime minister, epidemic mortality, real land tax rate, change in tax code, and war years.

+ Significant at the 10% level.

\* Significant at the 5% level.

Table 8  
Enclosure Acts Regression Results

	$\Delta$ Enclosure Acts			$\Delta$ Amendments
	(1)	(2)	(3)	(4)
$\Delta$ Real interest rate $t - 1$	-1.02*	-1.04*	-.81*	.01
	(.28)	(.27)	(.29)	(.03)
$\Delta$ Real interest rate $t - 2$			-1.26*	
			(.50)	
$\Delta$ Trade $t - 1$	.45	.43	.26	-.04
	(.32)	(.34)	(.32)	(.04)
$\Delta$ Trade $t - 2$			.04	
			(.35)	
Control variables	No	Yes	Yes	Yes
F-test statistic	11	7	8	1
Degrees of freedom	2, 64	9, 57	11, 55	9, 57
$\Delta$ Real interest rate $t - 1 + \Delta$ real interest rate $t - 2$			-2.07*	
p-Value			.00	
$\Delta$ Trade $t - 1 + \Delta$ trade $t - 2$			.30	
p-Value			(.61)	

**Note.**  $N = 66$ . Standard errors are calculated using the Newey-West procedure with two lags. Control variables include years of election, death of a monarch, change in prime minister, epidemic mortality, real land tax rate, change in tax code, and war years.

\* Significant at the 5% level.

6 restricts the analysis to statutory authorities related to the improvement of urban infrastructure and provision of urban services. The results reveal strong correlations between economic conditions that influenced the value of statutory authorities and the number of statutory authority acts passed by Parliament. 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. Granger causality tests indicate that causation ran from changes in economic conditions to changes in legislative outcomes.<sup>12</sup>

Table 8 examines enclosure acts. As with estate acts, the reaction to changes in the real interest rate appears to have occurred over a period of 2 years. The placebo group, acts amending enclosure acts, 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.

So far, our results illuminate correlations between changes in the quantity of legislation, changes in the volume of trade, and changes in the real interest rate. The direction of causation appears to be from economic conditions to legislative outcomes, but the results cannot rule out all potential counterhypotheses. We

<sup>12</sup> The Granger causality test comes from a three-variable VAR model. The test indicates that changes in trade and real interest rates Granger caused changes in statutory authority acts ( $p$ -values of .09 and .01, respectively). In contrast, changes in statutory authority acts did not Granger cause changes in trade or real interest rates ( $p$ -values of .86 and .52, respectively).

address this issue using tree-ring measurements for Britain and its major trading partners as instruments for exogenous changes in economic conditions.

Our analysis focuses on statutory authority acts, where clear results arise, probably because trade consisted largely of agricultural products and statutory authorities primarily financed improvements in transportation. In Table 9, column 2 reports results from a two-stage least squares (2SLS) regression of the change in statutory authority acts in year  $t$  on the change in trade in  $t - 1$ . The second stage includes all the control variables in  $t - 2$  but excludes tree-ring measurements. The first stage includes the change in tree-ring measurements for Britain in the years  $t - 2$ ,  $t - 3$ , and  $t - 4$  and all the control variables in  $t - 2$ . The estimated effect of a change in trade on the change in statutory authority acts is positive and statistically significant at the 10 percent level. The coefficient is larger than the estimate in the comparable ordinary least squares (OLS) model. The hypothesis that the coefficient on trade in the 2SLS model is equal to the coefficient in the OLS model cannot be rejected. This indicates that our OLS model is an accurate assessment of the effect of trade on statutory authority acts.

Table 9 shows that tree-ring measurements are valid instruments. The lagged values for UK tree-ring measurements are jointly significant in the first stage at the 10 percent level. Ideally, the  $F$ -statistic would be larger, avoiding a weak-instruments problem, but the estimate seems sensible, given that many factors influenced the volume of trade and that climatic conditions influenced the economy with variable and extended lags. The overidentification test confirms our intuition that tree-ring measurements were exogenous.

Column 3 reports results from an expanded set of tree-ring measurements including Britain's major trading partners. The results indicate that exogenous changes in trade had a positive and significant effect on the number of statutory authorities. The hypothesis of equality between the OLS and 2SLS coefficients cannot be rejected. Concerns arise with the first stage of this regression. While adding instruments improves the fit of the first stage (the  $R$ -squared statistic in the first stage increases from .14 to .31), the  $F$ -statistic decreases, and the instruments no longer appear jointly significant. This appearance, however, occurs because we do not account for differences in the length of time for which climatic shocks in various countries affected English trade. Controlling for these lags alleviates the problem but imposes additional assumptions.

Results for regressions that use the change in the real interest rates as the endogenous variable resemble those for the volume of trade. The second-stage regressions indicate that our OLS regressions had little bias. Changes in real interest rates caused changes in statutory authorities. The first-stage regression indicates that tree rings are a valid instrument—tree rings pass both the goodness-of-fit and overidentification tests.

The results from a 2SLS model that includes both the changes in real interest rates and in trade as endogenous variables resemble those of the previous regressions. A positive correlation exists between the volume of trade and the

Table 9  
Statutory Authority Acts: Ordinary Least Squares (OLS) and Two-Stage Least Squares (2SLS) Results

	OLS (1)	2SLS (2)	2SLS (3)	OLS (4)	2SLS (5)	2SLS (6)
$\Delta$ Real interest rate $t - 1$				$-1.12^*$ (.38)	$-1.54^*$ (.68)	$-1.28^+$ (.75)
$\Delta$ Trade $t - 1$	$1.00^*$ (.35)	$1.76^+$ (.96)	$1.42^*$ (.67)			$1.20^+$ (.66)
$F$ -test statistic (first stage)		2.45	1.38		1.79	1.47
$p$ -Value		.07	.16		.04	.05
Overidentification statistic		.96	19.01		21.40	17.23
$p$ -Value		.62	.33		.21	.37
Regions with tree-ring data		United Kingdom	New York, Virginia, France, Spanish Netherlands, Silesia, United Kingdom		New York, Virginia, France, Spanish Netherlands, Silesia, United Kingdom	New York, Virginia, France, Spanish Netherlands, Virginia, United Kingdom

**Note.**  $N = 124$ . Control variables are included in all models. Robust standard errors are reported. The Spanish Netherlands are modern-day Belgium; Silesia is modern-day Poland. Three lags are included for tree-ring data.

<sup>+</sup> Significant at the 10% level.

\* Significant at the 5% level.

quantity of legislation. A negative correlation exists between the real interest rate and the quantity of legislation. Causation runs from changes in economic conditions to changes in the quantity of legislation.

A series of historical examples strengthens our arguments concerning causality. The first is Lancashire's turnpike-building boom. During the 1760s and 1770s, technological innovations dramatically lowered the cost of spinning yarn and dramatically increased the production of cotton cloth. The city of Manchester was the center of this industrial revolution. In 1780, few improved roads linked Manchester to 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 textile production. In 1792, for instance, the revolution in France and a blockade of French ports reduced competition for English manufactures. English imports of raw cotton rose, and exports of finished cloth surged. In the following year, 1793, Parliament received a surge in turnpike proposals from the Lancashire textile region exceeding the number of all acts proposed in the previous 10 years combined. 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 for 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 3 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 percent. A building boom ensued. During the next 3 years, landholders sought large numbers of acts reorganizing rights to estates on London's periphery.

The texts of these acts prove particularly illuminating. Consider the case of 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" (6 Geo. 3, c. 45 [private]). 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.

How responsive was Parliament to changes in the demand for acts reorganizing rights? A few calculations reveal the answer to this inquiry. The sums of the coefficients for the real interest rate in Tables 5, 7, and 8 are  $-.51$ ,  $-1.14$ , and  $-2.07$ . Multiplying those coefficients by the standard error of the yearly difference in real interest rates (4.9) indicates that a 1-standard-deviation decline coincided with an increase of 2.5 in the yearly difference in estate acts, an increase of 5.6 in statutory authority acts, and an increase of 10.1 in enclosure acts. Thus, a 1-standard-deviation change in the yearly difference in interest rates explains approximately 35 percent ( $2.5/7.2$ ) of a 1-standard-deviation change in the yearly difference in estate acts, 29 percent ( $5.6/19.4$ ) of a 1-standard-deviation change for statutory authority acts, and 73 percent ( $10.1/13.8$ ) of a 1-standard-deviation change for enclosure acts. Similarly, a 1-standard-deviation change in the yearly difference in trade explains 24 percent of a 1-standard-deviation change for statutory authority acts. Short-run fluctuations in trade explain around 19 percent of the variation in transportation acts and 25 percent of the variation in urban acts.

## 6. 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 process was rapid, affordable, and consensual. The forum operated elastically. When returns from reorganizing rights rose, the public requested and Parliament passed larger numbers of acts. Reorganizing rights in this way was a principal occupation of Parliament during the century preceding industrialization. From 1700 to 1830, estate, statutory authority, and enclosure acts made up more than half of all legislation passed by Parliament.

These acts probably contributed to Britain's economic ascent. The acts loosened constraints on investment inherent in Britain's medieval landholding system, which could not accommodate modern economic opportunities. Parliament's impact appears to have increased during the eighteenth and nineteenth centuries, as the constraints inherent in the property rights system became increasingly binding. Relaxing these constraints was probably a necessary condition

for English economic development. Entrepreneurs, landowners, and localities would have forgone investment opportunities without alterations in their property rights.

In other European nations, inflexible property rights regimes prevented entrepreneurs from exploiting emerging opportunities. In France, for example, the sclerotic landholding system impeded the construction of infrastructure such as canals, even when returns from their operation would have substantially exceeded construction costs (Rosenthal 1992). The principal problem involved establishing rights-of-way. Local groups who opposed projects (or hoped for a larger share of the profits) could perpetually delay construction by repeatedly suing in slow and inefficient courts. Only after its revolution did France simplify procedures for establishing rights-of-way. Through statutory authority acts Britain established procedures for establishing rights-of-way more than a century before France and other countries on the Continent.

Why did Parliament establish such institutions when it did? The proximate answer is the Glorious Revolution of 1688, after which Britain became a constitutional monarchy and the political system changed in fundamental ways. Parliamentary supremacy triggered transcendent political and intellectual developments. The Bill of Rights in 1689 (and subsequent legislation) encouraged the expansion of legislative activity. Parliament began meeting on a predictable, annual schedule and setting its own agenda, and it established a permanent bureaucracy and procedures for processing petitions. Streamlined procedures reduced the cost of submitting bills and increased the predictability of passage. A cadre of professional solicitors and clerks emerged to help petitions through the parliamentary process. By the 1720s, capacity expanded to the point where the legislative process could effectively accommodate almost any demand for legislation reorganizing property rights.

The political system that solidified at that time internalized a balance of political power among landowning, mercantile, courtly, and aristocratic interests. That balance enabled individuals interested in economic development to pass acts restructuring property rights and promoting economic progress. Political stability ensured that those acts would not be overturned by the ascension of new regimes, via either violent revolution or parliamentary election. Parliament's decisions became the law of the land.

The emergence of Britain's system for reorganizing property rights also coincided with the intellectual revolution of the Enlightenment. The essence of the Enlightenment was the notion that natural laws could be identified and harnessed for the betterment of society (Mokyr 2002, 2009; Mokyr and Nye 2007). Enlightened English thinkers such as John Locke wrote repeatedly about the appropriate role for government (Locke [1690] 1988, chap. 5, secs. 34–35). Locke's concepts of property rights, civil government, and consent of the governed informed the individuals who reformed Britain's political system in the late seventeenth and early eighteenth centuries. These reforms allowed all citizens (not just the king and his appointees) to utilize forms of petition previously

employed for the reorganization of royal estates, appointments to royal offices, and the assignment of rights to aristocratic estates and chartered towns. The principal modification of the old form was the addition of clauses indicating that the acts would enhance the wealth of the realm and enable individuals and communities to prosper. These clauses provide textual evidence that Enlightenment ideals influenced estate, enclosure, and statutory authority acts.

We close by reemphasizing how our findings expand Coase's (1974) insights into Parliament and property rights in industrializing Britain. 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 that maximized the wealth of the realm. The evidence presented in this essay shows that Parliament operated in this way beginning in the early 1700s, a century and a half before the era studied by Coase.

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