Adaptable Property Rights:
Britain's Property System Before the Industrial Revolution

Dan Bogart
dbogart@uci.edu

and

Gary Richardson
garyr@uci.edu

Around 1700, Britain's Parliament established 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 our results. This evidence corroborates a cornerstone of our hypothesis, that British property rights became adaptable in the century preceding industrialization.

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Affiliations: Dan Bogart, Department of Economics, University of California at Irvine. Gary Richardson, Department of Economics, University of California at Irvine; National Bureau of Economic Research; and Mercatus Center.

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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 [1]

1. Introduction

Secure property rights have been seen as a source of prosperity at least since the writings of David Hume (1741) and Adam Smith (1776). Advocates of this idea include Ronald Coase, Douglas North, and Barry Weingast (Coase 1960, North 1981, North and Weingast 1989). Their conclusions, which have been widely cited, stem from studies of the British economy during the eighteenth and nineteenth centuries (see, for example, Acemoglu *et. al.* 2005). Recent scholars strive to determine additional dimensions of property rights regimes that promote economic growth (Acemoglu and Johnson 2005, De Soto 2000). This essay advances that line of research by studying the British property system in the century preceding industrialization. This exercise reveals a dimension of the property system – adaptability – that was new in the eighteenth century, unique to Britain at that time, perceived as crucial by contemporaries (see the quote by Jefferson above), but overlooked by twentieth-century social scientists. Adaptable property rights came to Britain around 1700, when Parliament created a forum that enabled landholders and communities to reform rights to particular plots of property.

Before the creation of this Parliamentary process, the property-rights regime inherited from Britain's medieval past possessed characteristics common to landholding systems in developing nations, past and present. A complex spectrum of overlapping rights (common,

[1] 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.

communal, clerical, feudal, familial, statutory, and royal) enforced by an array of courts (manorial, county, clerical, and royal) pertained to most plots of land. These courts lacked uniform records and a unified framework for determining ownership, transferring rights, and adjudicating disputes. The rights of families and ancestors received prominence over the rights of individuals and descendents. Rights were secure and in many ways marketable. Individuals could transfer rights to employ land in traditional uses. But, rights were inflexible.

This medieval 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 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 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 antiquated property 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 rights regime, which valued tradition and stability above innovation and flexibility.

Inflexibility bedeviled Britain's landholding system until the end of the seventeenth century, when Parliament embraced novel ideas concerning property and began processing petitions from groups hoping to reorganize rights to land and resources. Parliament reviewed requests from individuals, families, and communities, and after considering the interests of all concerned and the general public, rewrote rules regarding the use and ownership of property. 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 argues that the public approached Parliament and requested to reorganize rights when economic opportunities made it profitable to do so. Parliament accommodated the public's demands. A principal testable implication of this adaptability hypothesis concerns the

relationship between economic conditions and the passage of estate, statutory authority, and enclosure acts. If the adaptability hypothesis is correct, then conditions that increased returns from reorganizing rights – for example, trade booms that increased returns to investing in infrastructure or low interest rates that decreased the costs of financing construction – should have encouraged people to propose and induced Parliament to pass larger numbers of acts. Conditions that lowered returns from reorganizing rights should have reduced the number of proposals, and in turn, Parliament should have passed fewer acts.

This essay tests these implications with new data on the number of acts that reorganized property rights and new methods designed to exploit that information to the fullest possible extent. Our methods begin with characterizations of the way in which people proposed and Parliament passed acts. These assumptions yield a model of the Parliamentary process, a series of reduced-form equations that can be estimated with the data at hand, and a logical way to interpret these estimates. These methods enable 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. These methods also enable us to examine placebo groups consisting of acts similar to estate, statutory authority, and enclosure acts, but which did not alter rights to land and resources. The placebos eliminate alternative explanations for the correlations in the data, and thus, yield clear conclusions about the patterns in the evidence.

The rest of this essay carries out this endeavor. The second section reviews the literature and sets the stage for our analysis. The third section describes estate, statutory authority, and enclosure acts along with the procedures for passing these acts. The fourth section describes the archival data that we employ and the new times series that we analyze. The fifth section introduces our mathematical model and statistical methods. The sixth section describes our

empirical results. The concluding section discusses implications for economic growth in the century preceding the Industrial Revolution and for the developing world today. Adaptability may be a dimension of property-rights regimes that deserves academic attention.

2: Literature Review

Studies of eighteenth and nineteenth century Britain inspired social scientists' emphasis on secure property rights. Leading contributors in this literature are North and Weingast (1989), who argue the Glorious Revolution of 1688 created a constitutional consensus in which Parliament prevented the royal government from expropriating citizens' property. The resulting protection of private wealth encouraged investment and innovation, initiating Britain's industrial expansion. Historians question North and Weingast's historical narrative. Gregory Clark (1996) argues that secure property rights existed far into the English past. Expropriation occurred only in exceptional circumstances, such as when individuals rebelled against the regime. Patrick O'Brien (1994) argues that the Glorious Revolution weakened property rights. After the Glorious Revolution, Parliament raised taxes, embarked on foreign wars, and regulated numerous industries.

Alternative interpretations of Parliament's impact on the economy abound. Joel Mokyr (2002, 2003, 2005) argues that Britain experienced an Industrial Enlightenment, which extended to Parliament's economic policies. Paul Langford (1991) stresses Parliament's involvement in local legislation and argues that after 1688, propertied Englishman used their control of the political system to benefit themselves and the larger economy. Julian Hoppit (1996, 1997) documents the rapid expansion of Parliamentary activity after the Glorious Revolution and argues that Parliament had a capacity to meet private and local demands for legislation. Hoppit's

work builds upon a venerable tradition of categorizing and counting acts. Examples include Tate (1967 and 1978), Turner (1980 and 1984), Innes (1997), and Wordie (1983).

We build upon this foundation by counting annual numbers of acts that altered property rights between 1700 and 1830. 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 Clark (2001). Both 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, it examines all acts that altered property rights. Emphasizing this common feature of estate, statutory authority, and enclosure acts reveals patterns previously obscured. Second, this essay derives statistical tests from economic models that reveal how to interpret the estimates. Third, this essay emphasizes statistical inference and identification. Its methods ensure that correlations between property rights and economic incentives arise for real reasons, rather than statistical complications that often generate spurious correlations between time-series variables that trend across time. Fourth, this essay employs placebo groups to check the robustness of results.

This essay extends the law and economics literature by emphasizing the importance of adaptable institutions. Scholars have examined adaptability in contexts such as the settlement of the western United States and the Brazilian Amazon (see Libecap 1989, Alston, Libecap, and Mueller 1999). These studies conceptualize the demand for establishing property rights as a function of property rights' economic value. The supply of rights depends upon the costs that governments (and other entities) incur to establish and enforce rights. This notion of the demand and supply of property rights forms the foundation for our statistical analysis.

3. Acts that Reorganized Rights to Land and Resources

This section describes estate, statutory authority, and enclosures acts, which comprised over half of all legislation passed between 1700 and 1830. These acts possessed common themes. All affected individuals' and organizations' rights. Some 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, largely in an effort to adhere to the wishes of the deceased (who bequeathed the property to their descendents as long as the latter fulfilled conditions set out in the settlement), 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 (See for example, English and Saville 1983; Habakkuk 1994).

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.[2] Interpreting settlements required experience, skill, detailed knowledge of the document, and a large library of property laws, precedents, and legal texts estimated at 674

[2] The fact that until the Conveyancing Act of 1881, solicitors were paid for conveyances by the word (1s for every 72 words in 1862), did not encourage conciseness (England and Seville, 1983, p. 18).

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. As we show in a companion paper (Bogart and Richardson 2008), 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 whomever built lighthouses on particular plots of land to collect tolls from all ships that passed.

To accomplish these tasks, statutory authority acts created non-profit organizations and enjoined the trustees of these entities to serve the public interest.[3] The trustees tended to be local landowners and merchants, who served without remuneration. For canals and railways, however, statutory authority acts established for-profit organizations such as joint-stock companies, whose directors purchased shares of the organizations and profited from their investments.

Statutory authority acts granted rights to these new organizations. 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, enshrined in medieval town charters and confirmed by the Magna Carta. 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,

[3] See Webb and Webb (1963) for a description of the organizations established by statutory authority acts.

and for each group, a maximum permissible toll. Similar schedules regulated the issuance of debt and terms of interest.

Statutory authority acts could be amended by subsequent acts which clarified the rights and responsibilities of the organization. Canal acts were often amended in order to add branch lines or to increase the authorized capital. Turnpike acts had to be renewed, since they expired after 21 years. Renewals often expanded trustees' authority, by allowing them to manage a larger road network or altering the schedule of tolls.

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.

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 implement the terms of the act.[4] 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

[4] In 1801, the first General Enclosure Act simplified the administration of enclosure bills by providing guidelines for those drafting enclosure bills and parameters for permissible outcomes.

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

In the 1690s and early 1700s, Parliament standardized procedures for processing estate, statutory authority, and enclosure bills. Estate acts began with a petition from an individual or family desiring to change the rules regarding their estate. The petitioner hired a lawyer specializing in estate law to prepare their paperwork. A Parliamentary committee investigated the merits of the petition and issued a report. Petitions deemed beneficial to all interested parties were written into bills, read to the public three times, passed through both Houses of Parliament, and then sent to the King for royal assent. Public notice ensured that individuals with interests in the estate knew about the proposal. Parties could oppose the bill by submitting counter-petitions to either house of Parliament. Parliamentary committees considered the contending proposals, and then passed one of the bills, modified the original bill to satisfy the opposition, or rejected both proposals. The multiple layers for review and numerous opportunities for opposition ensured that Parliament considered the interests of all concerned before coming to a decision (English and Saville, 1983, p. 50).

Statutory authority acts began with a petition from a community stating a problem, such as insufficient road capacity between two places, and proposing a solution, such as the creation of a turnpike between the cities. Leading members of the community hired lawyers to prepare

their petitions. A Parliamentary committee considered the petition and drafted a bill on this issue. The bill was read publicly three times before both houses of Parliament. The readings allowed potential opponents to express opinions and propose amendments. Advocates and opponents typically hired solicitors to present their cases and promote their interests. Like modern-day lobbyists, these solicitors maintained regular contact with members of the committees working on these issues.

Enclosure acts went through a similar procedure. Parities 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. Advocates submitted the petition to Parliament, where the bill was read publicly three times and considered by both houses.

These procedures provided individuals and communities many avenues for approaching Parliament. Numerous lawyers and law firms handled petitions concerning property rights. Lawyers could be hired from local communities or from London. Members of the Parliament could sponsor bills from any constituency. Members often sponsored local projects, but could (and did) sponsor bills from anywhere in the realm. Parliamentary committees were large, often consisting of more than thirty members. Parliamentary procedures invited members of Parliament from all nearby counties to participate in the meetings. Members of Parliament from any political party could sponsor bills. Evidence indicates that after 1720, members from the minority party were as likely to sponsor a bill as members from the majority. These facts indicate that no group controlled access to acts altering property.

4. Data

The Parliamentary Archive is the principal repository for historical information on acts of Parliament. The 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.[5] 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.

An earlier paper explains our process for converting the clerical title of every act of Parliament into a vector of variables (Bogart and Richardson, 2007). In this essay, we convert those vectors of variables into time series suitable for statistical analysis. Tables 1 through 3 describe those series. The top-half of Table 1 describes 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 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. Column (3) indicates the annual average. Column (4) indicates the standard deviation. Column (5) indicates the minimum number passed in a single year. Column (6) indicates the maximum number. 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

[5] 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.

property. Row (d) indicates the annual number of acts that authorized either sales or leases. 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.

The bottom-half of Table 1 describes 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. These appear in rows (e) through (g) respectively. The sum of these series appears in row (h). 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 statutory authority acts' placebo group: 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 Parliament.[6]

[6] The accuracy of the data depicted in Tables 1 through 3 depends upon our ability to accurately determine the date on which acts passed. For most of our sample period, 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

Table 4 lists the explanatory variables. Rows (a) and (b) refer to two variables, the real interest rate and the volume of foreign trade, which influenced the demand for estate, enclosure, and statutory authority acts. 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.[7] 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 new and more productive uses. The volume of trade also measured the health of the industrial and mercantile sectors relative to the agricultural economy.[8]

Rows (c), (d), and (e) refer to variables that influenced the political process for passing acts. These variables – years when the monarch died, years when a new prime minister assumed office, and years when Parliamentary elections occurred – influenced the number of days that Parliament sat in session, legislators' incentives for passing local legislation, and other factors generating annual variation in Parliamentary productivity.[9] Additional explanatory variables, listed in Rows (f) through (j), include indicators for years when Britain was at war, when Britain suffered disease epidemics, and when Britain changed the structure of its land tax system. The

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period. In the eighteenth century, 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. Complications arose, however, in the winters of 1714-1715, 1751-1752, and 1760-1761, when 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 in two ways. First, we run regressions with the raw data, while assigning dummy variables to the years in which Parliament did not meet and the years in which Parliament met twice. Second, we drop the period of problematic dating from our sample, and run regressions for the years 1763 through 1830, when all acts are precisely dated. The two methods yield similar results.

7 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.

8 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.

9 We take these variables from histories of England and its government by Holmes (1993), Holmes and Szechi (1993), and Evans (2001).

set of explanatory variables also includes the land tax rate in shillings per acre and an index of climatic conditions, based on tree ring measurements, which reflects exogenous factors affecting agricultural productivity.

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.

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

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. $X = \{x_1, x_2, \ldots, x_I\}$, where x_i represents the ith factor. To keep the notation clear, assume $0 < \partial F / \partial x_i < \infty \quad \forall\ i = 1,\ldots,I$. 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, monarchial 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 supplicants employed to prepare and advance their petitions as well as the procedures, campaign

contributions, and side payments – both in London 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 many lawyers that prepared petitions and approach almost any member of Parliament. As a first-order approximation, we summarize this process with a supply function.

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

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, $Z = \{z_1, z_2, \ldots, z_J\}$, where z_i represents the j^{th} factor. To keep the notation clear, assume $\partial G/\partial z_j > 0 \quad \forall \quad j = 1,\ldots,J$. 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.

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

If the markup exceeds zero, then someone in the act-passing process (either lobbyists, opponents of the legislation, or members of Parliament) 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) $$F(q^*, X^*) - G(q^*, Z^*) = m$$

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

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) $$q^* = Q(X^*, Z^*)$$

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

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

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

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

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

where ΔA_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^{th} demand shift variable from *t-2* to *t-1*. α_i is an estimate of $\partial q_* / \partial x_i$. $\Delta z_{j,t-1}$ is the change in the j^{th} supply

shift variable from *t-2* to *t-1*. β_j is an estimate of $\partial q_* / \partial z_j$. ε_t is an error term. Explanatory variables are lagged one-year to capture the time necessary to respond to changing circumstances, prepare petitions, approach Parliament, and request acts.[10]

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, our estimates do enable us to characterize the shapes of those curves. Propositions 1 and 2 indicate how.

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

Proposition 2. If $\partial q_* / \partial z_j \neq 0$ for some *j*, then $\partial F(q_*, X_*) / \partial q_* > -\infty$.

Proof. This is a proof by contraposition. Assume $\partial F(q_*, X_*) / \partial q_* = -\infty$. Then, $\frac{\partial q_*}{\partial z_j} = \frac{-\partial G(q_*, Z_*) / \partial z_j}{-\infty - \partial G(q_*, Z_*) / \partial q_*} = 0 \quad \forall\ j = 1,...,J$ because by definition $\partial G(q_*, Z_*) / \partial q_* \geq 0$ and $\partial G(q_*, Z_*) / \partial z_j < \infty$.

In prose, Proposition 2 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.[11]

[10] 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.

In cases where economic theory or external evidence indicate that a variable shifts only demand (or only supply), then our estimates reveal more about the shape of the demand (or supply) functions. 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 estimates reveal the net effects.

Our placebo groups ensure that our assumptions about whether variables shifted demand or supply 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.

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[11] Determining whether α_i, our estimate of $\partial q_* / \partial x_i$, and β_j, our estimate of $\partial q_* / \partial z_j$, differ from zero involves hypothesis tests. For the null hypothesis $\alpha_i = 0$, the alterative hypothesis is $\alpha_i \neq 0$. For the null hypothesis $\beta_j = 0$, the alterative hypothesis is $\beta_j \neq 0$. The test statistic has a t-distribution.

6. Results

Table 5 presents results of this exercise for estate acts.[12] Column (1) regresses the year-to-year change in the annual number of estate acts on year-to-year changes in the variable that should have influenced the demand for estate acts: the real interest rate. 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 regression reveals a correlation between changes in the number of estate acts and changes in the real interest rate. When the interest rate rose and the cost of investing increased, the number of estate acts fell, as our hypothesis predicts. The correlation is significant in statistical terms and substantial in magnitude. Column (2) adds year-to-year changes in three explanatory variables that influenced the productivity of parliament: election years, changes of the prime minister, and the death of a monarch. In this specification, as in all others, the coefficient on the real interest rate remains statistically and economically significant. Column (3) adds additional explanatory variables, including year-to-year changes in the real land tax rate, years where the tax code changed, 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 belligerent status. The real interest

[12] While some of the series, A_t, $x_{i,t-1}$, and $z_{j,t-1}$, exhibit trends and are non-stationary, the differences of those series, ΔA_t $\Delta x_{i,t-1}$ $\Delta z_{j,t-1}$, which enter the estimating equation, are stationary. For some of the differenced series, the error term, ε_t, is auto correlated and heteroskedastic. Therefore, the Newey-West procedure for estimating a heteroskedastic and autocorrelation consistent covariance matrix is an appropriate method for calculating the standard errors of our estimates (Newey and West 1987).

rate remains significant. An array of robustness checks demonstrates that these regressions are robust to a wide range of alternative specifications.[13]

Columns (4) through (6) perform the same exercise for a placebo group: marriage, naturalization, and office acts. These non-estate private acts resembled estate acts in many dimensions but the value of placebo acts did not depend upon returns from reorganizing rights to land and resources. The coefficients are insignificant, indicating that excluded variables which influenced private acts' passage through Parliament did not drive the results of specifications (1) through (3). The insignificant coefficient also corroborates our conclusion that changes in the real interest rate altered the demand for acts reorganizing property rights, 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.

Columns (7) and (8) reinforce this result. Column (7) employs non-estate private acts as an explanatory variable. Column (8) employs the residual from a regression of all non-estate private acts on the explanatory variables in columns (4) through (6). The results of these regressions indicate that non-estate private acts were correlated neither with the real interest rate nor with acts that reorganized property rights.

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

[13] 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.

period and for the cleanest data. Column (4) shows that these results hold when the dependent variable is limited to 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. Overall, Tables 5 and 6 indicate that changes in the interest rate coincided with changes in the number of acts authorizing the sale, lease, and reorganization of land.

Table 7 presents the results for statutory authorities. Column (1) regresses the change in the number of statutory authority acts on the variables that influence the demand: the change in the real interest rate and the change in the level of trade. Column (2) adds to the regression variables that shift the supply curve including years of elections, changes in the prime minister (and thus, the coalition controlling Parliament), and the death of the monarch. Column (3) adds to the regression our vector of control variables. Column (4) regresses the same variables for the years 1763 to 1830, for which the dating of acts poses no problems. Column (5) regresses changes in the number of transportation acts on the full spectrum of independent variables introduced in the previous column. Column (6) regresses changes in the number of acts pertaining to urban services and infrastructure on the full spectrum of independent variables.

The result reveals 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. The null hypothesis that the coefficients equal zero is rejected at the 1% significance level. This

result holds for all specifications, including numerous permutations which we examined to determine the robustness of our result, but which to save space, have not included in this essay.[14]

How responsive was Parliament to changes in the demand for acts reorganizing rights? A few calculations reveal the answer to this inquiry. The standard deviation of the change in the real interest rate is 4.90. The average of coefficient on the real interest rate in columns (1) through (3) is -1.04. Multiplying those numbers indicates that a one standard deviation decline in the real interest rate coincided with an increase of 5.05 in the number of statutory authority acts. The standard deviation of the change in the number of statutory authority acts is 16.84. Thus, a one standard deviation decline in interest rates explains approximately 30% (~5.05/16.84) of a standard deviation change in the number of statutory authority acts. Similarly, the standard deviation of the change in trade is 4.66. The average of the coefficient on trade in columns (1) through (3) is 1.02. The product of those numbers is 4.8. Thus, a one standard deviation change in the volume of trade explains 29% of a standard deviation change in the number of statutory authority acts. Parliamentary accommodation of the public's demands, in other words, explains the majority of the annual fluctuation in statutory authority acts.

Columns (4) and (5) indicate that this finding holds for subcategories of statutory authorities associated with the modernization of the English economy: transportation improvements and urban expansion. Multiplying the standard deviation of the real rate with the coefficient in Column (5) and dividing by the standard deviation of transportation acts (11.9)

[14] Neither the signs nor the significance levels of the coefficients change when the endpoints of the analysis change by a decade or more. Regressions employing data only for the period for which we can date acts precisely (1764 to 1830) yield coefficients nearly identical to those for the full sample. The estimates are also unaffected by the inclusion of additional explanatory variables. When the change in industrial production appears as an explanatory variable, the results remain the same, and industrial production is insignificant, unless trade is excluded. In the latter case, the coefficient on industrial production becomes statistically and substantively significant and explains about as much of the variation in the dependent variable as had trade. Adding indictors for the onset and cessation of military hostilities does not alter the results. Interacting years of military conflict with the principal explanatory variables strengthens the results.

indicates that fluctuations in the real rate explain 23% of the fluctuation in transportation acts. Similar calculations indicate that fluctuations in the real rate explain 21% of the fluctuation in acts for improving infrastructure and public services in urban communities. Fluctuations in trade explain 23% of the variation in transportation acts and 23% of the variation in urban acts.

Columns (7) and (8) examine the placebo group: changes in the number of government finance acts. These acts are uncorrelated with changes in interest rates and changes in the volume of trade. Adding them as an explanatory variable alters neither the signs nor the magnitudes of the other explanatory variables.

Table 8 examines enclosure acts. Columns (1) through (3) show the number of enclosures increased when interest rates fell, and the number of enclosures fell when interest rates rose. This result reinforces the findings of previous studies showing an inverse correlation between interest rates and enclosures (Crafts 1977 and Clark 2001). We show that this relationship exists even after controlling for confounding variables and autocorrelation. We also show that the relationship between enclosures and interest rates resembles the relationship between statutory authorities and interest rates in quantitative terms. A one-percent decline in real interest rates, for example, increased the number of enclosures by roughly one-half of an act and increased the number of transportation acts by the same amount. Column (4) shows that there is no correlation between enclosure amendments and interest rates, which suggests that the variation in the number of enclosure acts was not driven by changes in unobserved factors correlated with our explanatory variables (i.e. factors that altered the costs or benefits of creating acts).

Together, Tables 5 through 8 illuminate two important patterns. First, the equilibrium number of acts reorganizing property rights changed in response to changes in the interest rate and volume of trade, two of the principal factors influencing the 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 not inelastic. The political process, in other words, responded flexibly to demands to reorganize property rights.

Second, the equilibrium number of acts reorganizing property rights also changed in response to political factors. In most specifications of our regressions, for example, the number of acts declined in the year after an election. The decline was often sizeable. On average in years after elections, Parliament passed seven fewer statutory authorities, six fewer enclosures, and three fewer estate acts.[15] Elections might have influenced the passage of legislation in many ways. Elections altered the length of time that Parliament sat in session, legislators' incentives for passing local legislation, the stability of political coalitions, the composition of committee membership, and the experience level of persons sitting in Parliament.

Our demand-and-supply framework reveals an interpretation of this result. Since supply factors influenced the number of acts passed by Parliament, the demand curve for acts sloped downwards. In other words, when the price of obtaining acts reorganizing property rights increased (or decreased), the number of acts that the public desired decreased (or increased).

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 previous sections of this paper showed that Parliament responded to the public's desire to adapt property rights to changing conditions. Property rights became

[15] In some specifications of our regressions, the number of acts changed in the year after a new prime minister assumed office or the monarch died, although the sign and significance of these coefficients varied across specifications.

adaptable, in other words, in the century preceding industrialization. Did adaptability make a difference? This section addresses that question.

Evidence from an array of sources indicates that acts reorganizing property rights encouraged economic development. Statutory authorities facilitated 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).

Enclosures served as a catalyst for increasing agricultural productivity (Richardson, 2001). Enclosures enabled farmers to introduce new crops, improve livestock, reduce overuse of common resources, and react to market opportunities.[16] Enclosures had additional effects that scholars have yet to study but that appear often in our database. Enclosures authorized the recovery of wastelands, the drainage of fens, and the construction of irrigation channels. Enclosures transferred agricultural land to urban and industrial uses, particularly near expanding towns and cities.

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

[16] Robert Allen (1992) and Clark (1998) find these factors' impact on the productivity of arable land to be positive, but limited.

and enabled the exploitation of opportunities arising in a dynamic economy. The lowering of transaction costs enhanced efficiency and encouraged investment. The lowering of such barriers has long been considered a principal force propelling European economic progress (North, 1981).

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 (Williamson, 1985).

Britain's system for reorganizing property rights was unique among European nations. In most countries, the transition from medieval to modern landholding systems involved spasms of reform and rebellion. In France after 1789 and Russia after 1917, for example, revolutionaries annulled laws binding land and labor to traditional tasks; voided privileges possessed by nobles, clergy, and corporations; redistributed political power; and restructured anachronistic property-rights regimes.

Before these revolutions, 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 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.[17]

Britain established procedures for establishing rights of way more than a century before France and other countries on the continent. Britain created these procedures at the time that Parliament established procedures for passing estate, statutory authority, and enclosure acts. Why did Parliament change the way it regulated property at that time? The immediate factors were the political changes in the late seventeenth and early eighteenth centuries. After the Glorious Revolution of 1688, Britain became a constitutional monarchy. The Bill of Rights of 1689 encouraged the expansion of legislative activity. Parliament began meeting on a predictable, annual schedule and setting its own agenda. Parliament established a permanent bureaucracy and streamlined procedures for processing petitions. These 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.[18]

Parliament often amended ancient economic rights, if amending rights allowed resources to be put to more productive uses. Parliament felt free to change rules regarding how land could be used. Parliament also felt free to change the legal owners of land. But, Parliament protected incomes derived from rights to land. Parliament ensured individuals received compensation for the rights that they lost. Parliament, in other words, provided security for income derived from rights to property, but not security for ownership of particular pieces of property or rules binding

[17] Evidence also indicates that during the eighteenth century, French cultivation continued as it had in the Middle Ages. In England, however, "agriculture entered a dynamic period of rapid and far reaching change (Sexauer 1976)."

[18] There is a large literature describing the improvement of private bill procedures in the early 18th century. See Clifford (1885), Williams (1948), Thomas (1971), and Hoppit (1996).

land to traditional uses. In sum, adaptable rights to land use coexisted with secure rights to income from land.

The seminal studies of Ronald Coase (1960, 1974) illuminate the importance of Britain's adaptable property-rights regime. Coase argues that in the presence of transaction costs, attaining economic efficiency requires the proper definition and allocation of property rights. In "The Problem of Social Cost (1960)" Coase argues that nineteenth-century British common and statutory law recognized these principles, and that Britain's courts and Parliament reallocated property rights to encourage economic efficiency. In "The Lighthouse in Economics," Coase (1974) argues that in the nineteenth century, Parliament's creation of statutory authorities encouraged the provision of public goods and services. Coase illuminates his assertion with an example. Parliament assigned 'lighthouse rights' to certain plots of land. Lighthouse rights allowed anyone operating a lighthouse to collect tolls from passing vessels. These new rights superseded ancient rights guaranteeing vessels transit free from tax or toll. Our research suggests that Parliament began to operate in the way that Coase described soon after the Glorious Revolution, more than one-hundred and thirty years before the period that Coase studied, and that Parliament's efforts to reorganize rights extended across the entire economy.[19]

What are the broader lessons from Britain's property rights revolution? Adaptable property-rights may be as important as secure property-rights. Both may be necessary for economic development. One way to create adaptable property-rights is to establish political procedures that generate consent for change and ensure that vested interests do not oppose

[19] Previous scholars emphasized the first half of Coase's essay, "The Problem of Social Costs (1960)," which models a world without transaction costs in which any assignment of secure property rights results in an efficient outcome. We emphasize the second section of Coase's essay, which models a world with transaction costs. In such a world, some distribution of property rights lead to efficient outcomes, while others trap people in poverty. The market alone may not alleviate this affliction. Some institution, such as Parliament, must lower transaction costs and/or reassign rights in order for efficiency to arise.

development. Piecemeal actions that address specific problems facing individuals and communities may be easier to implement than widespread reforms that address general problems. The political procedures developed in eighteenth century Britain may have useful applications in developing nations today.

Table 1: Estate and Other Private Acts, Summary Statistics

		Δ Rights		Series in levels				Series in differences			
		Land	Personal	Avg	SD	Min	Max	Avg	SD	Min	Max
	Type of Acts	(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 “yes” for acts that did and “no” for acts that did not. Column (2) indicates acts that altered personal rights, marked “yes” 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

				Series in levels					Series in differences				
		Δ Rights To Land	Provide I & S	Avg	SD	Min	Max	Stat?	Avg	SD	Min	Max	Stat?
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(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

				Series in levels					Series in differences				
		Δ Rights To Land	Correct Error	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					
		Avg	SD	Min	Max	Description	Sources
		(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

	Δ Estate Acts			Δ Non-Estate Private Acts			Δ Estate Acts	
Variable	Sales+ Leases (1)	Sales+ Leases (2)	Sales+ Leases (3)	Marriage (4)	Naturalize (5)	Office (6)	Sales+ Leases (7)	Sales+ Leases (8)
Δ Real interest rate	**-0.22**	**-0.24**	**-0.24**	-0.02	-0.12	0.01	**-0.22**	**-0.24**
	[0.10]	[0.11]	[0.11]	[0.07]	[0.23]	[0.01]	[0.10]	[0.10]
Δ Trade	-0.06	-0.14	-0.15	0.02	0.01	*0.02*	-0.14	-0.14
	[0.12]	[0.13]	[0.13]	[0.03]	[0.12]	[0.01]	[0.13]	[0.13]
Δ Election		-0.76	-0.77	-0.57	-1.00	0.07	-0.57	-0.77
		[1.74]	[1.90]	[0.46]	[1.35]	[0.14]	[1.92]	[1.92]
Δ New Prime Minister		-1.79	-1.80	0.74	1.25	0.37	-2.02	-1.80
		[1.42]	[1.46]	[0.47]	[1.74]	[0.27]	[1.44]	[1.49]
Δ Monarch Dies		-2.89	-3.14	*-0.90*	2.50	0.85	-3.22	-3.14
		[2.02]	[2.38]	[0.48]	[1.88]	[0.55]	[2.26]	[2.27]
Δ Non-Estate Private Acts							0.12	
							[0.08]	
Residuals from Estimated Δ Non-Estate Private Acts								0.12
								[0.08]
Additional Controls ?	No	No	Yes	Yes	Yes	Yes	Yes	Yes
# Observations	124	124	124	124	124	124	124	124
F-test (deg. freedom)	(2,113)	(5,110)	(10,105)	(10,105)	(10,105)	(10,105)	(11,104)	(11,104)
F-test statistic	209	965	6604	46	37	1882	2333	3022

Bold face indicates significant at the 5% level. *Italic* indicates significance at the 10% level. Standard errors calculated using the Newey-West procedure with 4 lags.

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

Variable	Δ Estate Acts					Δ Non-Estate Private Acts			Δ Estate Acts	
	Sales+ Leases (1)	Sales+ Leases (2)	Sales+ Leases (3)	Sales (4)	Leases (5)	Marriage (6)	Naturalize (7)	Office (8)	Sales+ Leases (9)	Sales+ Leases (10)
Δ Real interest rate	**-0.33**	**-0.39**	**-0.35**	*-0.15*	**-0.24**	-0.10	-0.29	-0.00	**-0.35**	**-0.38**
	[0.14]	[0.13]	[0.15]	[0.09]	[0.11]	[0.09]	[0.25]	[0.01]	[0.12]	[0.12]
Δ Trade	-0.05	-0.18	-0.17	-0.04	**-0.14**	0.04	0.03	*0.015*	-0.18	-0.18
	[0.12]	[0.14]	[0.15]	[0.11]	[0.06]	[0.04]	[0.15]	[0.01]	[0.13]	[0.13]
Δ Election		**-3.46**	*-3.45*	**-2.49**	-0.97	-0.97	-0.17	-0.10	*-3.26*	**-3.46**
		[1.65]	[1.80]	[1.10]	[0.80]	[0.65]	[2.11]	[0.09]	[1.67]	[1.70]
Δ New Prime Minister		**-3.14**	*-3.04*	-0.96	**-2.19**	-0.82	1.67	**0.49**	**-3.40**	**-3.14**
		[1.42]	[1.72]	[1.47]	[0.55]	[0.69]	[2.70]	[0.24]	[1.43]	[1.49]
Δ Monarch Dies		1.80	2.44	*2.10*	-0.29	-0.32	3.99	*0.27*	1.46	1.81
		[2.08]	[2.46]	[1.25]	[1.32]	[0.80]	[3.02]	[0.15]	[1.94]	[2.04]
Δ Non-Estate Private Acts									0.08	
									[0.05]	
Residuals from Estimated Δ Non-Estate Private Acts										0.08
										[0.05]
Additional Controls?	No	No	Yes	No	No	No	No	No	No	No
# Observations	66	66	66	66	66	66	66	66	66	66
F-test (deg. freedom)	(2,64)	(5,61)	(10,56)	(5,61)	(5,61)	(5,61)	(5,61)	(5,61)	(6,60)	(6,60)
F-test statistic	3	5	3	2	6	5	1	1	5	5

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.

Table 7: Statutory Authority Acts, Regression Result

Variable	Δ Statutory Authorities							Δ Finance
	All	All	All	All	Transport	Urban	All	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Real interest rate	**-1.00**	**-1.05**	**-1.06**	*-1.14*	**-0.56**	**-0.30**	**-0.91**	0.00
	[0.33]	[0.32]	[0.34]	[0.59]	[0.21]	[0.15]	[0.30]	[0.35]
Δ Trade	**1.03**	**1.03**	**1.00**	**0.97**	**0.58**	**0.34**	**0.94**	0.63
	[0.36]	[0.32]	[0.33]	[0.36]	[0.25]	[0.12]	[0.42]	[0.70]
Δ Election		**-7.03**	**-7.09**	*-8.93*	**-6.06**	*-3.45*	*-6.07*	-2.49
		[3.14]	[3.14]	[4.94]	[2.02]	[1.21]	[3.08]	[3.24]
Δ New Prime Minister		*5.82*	*5.65*	6.88	**5.60**	0.51	6.25	4.32
		[3.27]	[3.33]	[4.89]	[2.29]	[1.71]	[3.84]	[3.99]
Δ Monarch Dies		-6.17	-6.12	-9.87	-5.30	*-4.39*	-6.76	2.54
		[5.10]	[5.00]	[7.58]	[3.72]	[2.62]	[5.43]	[6.05]
Δ Finance acts							0.17	
							[0.15]	
Additional Controls?	No	No	Yes	Yes	Yes	Yes	Yes	Yes
# Observations	124	124	124	66	124	124	119	119
F-test (deg freedom)	(2,113)	(5,110)	(8,107)	(8,58)	(8, 107)	(8, 107)	(9,102)	(8, 103)
F-test statistic	13	43	12	12	2284	177	6	2

Bold face indicates significant at the 5% level. *Italic* indicates significance at the 10% level. Standard errors calculated using the Newey-West procedure with 4 lags.

Table 8: Enclosure Acts

Variable	Δ Enclosure Acts (1)	(2)	(3)	Δ Enclosure Amendments (4)
Δ Real interest rate	**- 0.99**	*-0.67*	*-0.69*	0.03
	[0.23]	[0.37]	[0.37]	[0.03]
Δ Trade	0.50	*0.68*	*0.71*	-0.05
	[0.31]	[0.37]	[0.40]	[0.04]
Δ Election		**-6.05**	**-6.21**	0.27
		[2.44]	[2.52]	[0.45]
Δ New Prime Minister		3.88	3.83	0.08
		[4.70]	[4.77]	[0.28]
Δ Monarch Dies		**14.70**	**16.40**	**-2.88**
		[5.03]	[7.04]	[0.74]
Δ Land Tax Rate		-10.97	-10.59	-0.66
		[6.77]	[6.82]	[0.48]
Δ Enclosure Amendments			0.59	
			[1.14]	
Additional Controls?	No	No	No	No
# Observations	66	66	66	66
F-test (deg freedom)	(2,64)	(6,60)	(7,59)	(6,60)
F-test statistic	11	6	6	3

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.

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