

Shareholding, coalition formation and political development: evidence from 17th century England

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October 8, 2007

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Abstract

This paper documents the importance of shares in joint stock companies in aligning disparate interests and instituting representative government in 17th century England. The paper identifies a 70 percent increase due to shareholding on the probability of support for reforms by members of parliament during England's Civil War (1642-48). The paper suggests that shares allowed a broad spectrum of investors to benefit from new opportunities overseas. Because the rights needed to profit from overseas investment belonged to the executive, shareholding aligned incentives in favour of constitutional reforms. These reforms led to representative government and overseas public investments crucial for economic growth.

JEL codes: O10, O43, F10, K00, P10, N13

Keywords: Economic Growth, Financial Markets, Institutions, Trade, Law, Political Economy

1 Introduction

Much blame for under-development can be attributed to a failure to align the incentives of disparate interest groups in favour of political reform and beneficial public policies (Rajan 2006). A growing number of empirical studies have documented that societies with heterogeneous preferences and social divisions reduce growth and public goods provision (e.g. Alesina, Baqir and Easterly (1999), Banerjee, Iyer and Somanathan (2005)). Yet little empirical evidence exists on how successful constituencies for reform can be created across such disparate interests. This paper documents the role of a financial innovation— the issuance of shares in joint stock companies— in aligning the interests of disparate groups. The paper provides evidence that in one important case— England’s transition from monarchy to representative government in the 17th century— the introduction of shares in overseas companies helped generate a broad coalition that successfully challenged executive control and implemented public investments that were crucial for growth.

A key empirical challenge in measuring the effect of share ownership on political reform is that those that invest in shares may be selected on dimensions, such as wealth or security of domestic property, that might also influence support for reform. To address this challenge, this paper exploits variation in agents’ propensity to invest due to their differential exposure to the enthusiasm for overseas ventures that swept England in the wake of Francis Drake’s successful voyage around the world (1577-1580). The paper uses this variation to identify the effect of shareholding on support for representative government by members of parliament during England’s Civil War (1642-48).

Using a novel dataset on the social and economic interests of members of the Long Parliament (1640-60), the paper shows that shareholding in hitherto unprofitable joint-stock

companies increased the probability that a member of parliament joined the coalition in favour of increased legislative control by more than 70 percent. The effect of shareholding contrasts with a lack of evidence that a shared interest in protecting domestic property had any influence on support for political reform. The results are also not explained by other factors suggested to explain England's transition to representative government, including religion, new wealth, court and country distinctions or other regional differences.

Instead, the paper interprets these results as reflecting the role played by the introduction of shares in allowing a broad spectrum of investors to benefit from new opportunities overseas. Because the rights needed to profit from overseas investment belonged to the executive, the introduction of shares aligned the incentives of a broad coalition in favour of constitutional reforms aimed at seizing control of these rights. These reforms facilitated public investments overseas that proved crucial for England's economic growth.

Like many other historical and contemporary settings, England in the late 16th and early 17th centuries faced the possibility of an institutional resource curse. New resources had been discovered that allowed the owner of the existing rights to those resources— the incumbent executive— to enhance its wealth and political rights at the expense of others. This executive— the king of England— was becoming increasingly able to use the flow of wealth from these resources to reduce existing constraints on his authority.

In 17th century England, the new resources in question were those stemming from newly-discovered direct sea routes to the New World and Asia. Unlike domestic property rights, which had become relatively secure in England by the 17th century, overseas rights like those over the declaration and prosecution of war, trade and general foreign policy, constituted the very “sovereignty” rights that traditionally were the core responsibilities of kings. In early 17th century England, all these rights belonged to the monarch, who exploited them to pursue increasingly independent policies without the need for parliamentary taxes and its accompanying oversight.

However, this paper suggests that England escaped from suffering from an institu-

tional resource curse through the development of a new coalition that spanned a broad spectrum of initial interests and could thus successfully contest the monarch's control over the rights necessary to exploit new opportunities overseas. The introduction of shares in the late 16th century allowed a broad spectrum of non-merchants to benefit from new opportunities overseas without themselves having to be specialists in trade or navigation.¹ Shares thus aligned the interests of a broad coalition in favour of constitutional reforms and public goods that would support the expansion of overseas trade. This coalition sought such reforms through parliamentary means that ultimately led to Civil War.

England's constitutional reforms, initiated during the "Long Parliament" (1640-1660) that spanned the Civil War (1642-48), resulted in a transfer of control over war, foreign policy, customs and other forms of state finance from the monarch to parliament that ultimately formed the foundations of the most resilient tradition of representative government in modern times. This shift in constitutional control enabled the provision of a key set of public goods: the massive increase and deployment of Royal Navy ships in support of domestic defense and against competitor nations who had previously been successful in blocking direct English access to overseas trade and resources. These policies fostered overseas commerce and domestic manufacturing, playing an important role in the "Great Divergence" that led England to emerge from a commercial and industrial backwater to become the richest country in Europe in the 18th century (de la Escosura, ed 2004, Allen 2004).

This paper builds upon a series of important works assessing the role of constituencies and institutions in hindering or promoting the reforms conducive for economic growth and development (North and Thomas 1973, Acemoglu, Johnson and Robinson 2005a, Rajan 2006). These papers have focused on the role of "institutions" as political constraints

¹In the traditional "regulatory company", constituent merchants gained the freedom, often after long apprenticeships, to engage in a particular trade on their own account or in small partnerships. In contrast, agents of a joint-stock company traded on behalf of that firm, which had a unified management, and ownership—and thus risk—distributed among its often numerous shareholders.

that protect endowments. Individuals who share the same “endowment”—e.g. ethnicity, wealth or a political right—form a common interest or “constituency”. Constituencies seek to alter the political rules to defend or augment their own endowment, potentially at the cost of other interest groups. Thus, if the endowments of those groups with existing political power are threatened by economic growth, they may devise institutions that serve as a barrier to growth. Conversely, institutional reform may occur when groups whose endowments are threatened under the existing political system act to mitigate that threat (Rajan and Zingales 2005).

England’s political development in the 17th century has been highlighted as a central example in this literature. In their seminal paper, North and Weingast (1989) argue that the Civil War and the Glorious Revolution of 1688 took place to protect the existing wealth and property rights of property owners who were faced by the unusual avarice of Stuart monarchs. The successful removal of kings in both cases yielded a credible threat that then allowed future rulers to commit not to expropriate property. Alternative interpretations by Rajan and Zingales (2003) and Acemoglu, Johnson and Robinson (2005b) also stress the importance of property rights, contending that the wars were instigated by newly-enriched groups, whether an emergent gentry in the former case, or merchants who had benefited from the rise in Atlantic trade in the latter.

In all three interpretations, a constituency of wealth holders emerged for institutional reform that was able to obtain improved protection of domestic wealth and property rights in England, leading to economic development. However, these theories have thusfar proved difficult to reconcile with indirect empirical evidence that domestic property rights in England were secure before the Civil War and Glorious Revolution and relatively unchanged afterwards.²

²Clark (1996) finds no appreciable reduction on the interest rates on land due to the Glorious Revolution, as might be expected with a lower risk of expropriation. In fact, he shows that property rights over freehold land had been relatively strong throughout the seventeenth century. Similarly, examining the lending history of a London financier, Quinn (2001) fails to find a fall in interest rates on private capital. Sussman and Yafeh (2002) reveal that the interest rates on government debt responded more to Dutch capital markets and England’s wars than to any reduced political risk from the Glorious Revolution. See

This paper builds on these studies in a number of ways. First, the paper provides the first direct empirical evaluation of the importance of different endowments on individuals' decisions to support or oppose political reform. The paper documents the contrast between the lack of importance of domestic wealth and the significance of overseas interests in support for reform. By highlighting the empirical and constitutional distinction between the relative security of domestic property rights and the executive's discretion over rights overseas, the paper reconciles the property rights theories outlined above with the lack of empirical evidence for a change in the security of domestic property in England.

Next, the paper addresses the crucial question of how constituency for reform was created. With domestic property rights already secure, no shared interest existed among wealthholders to protect their domestic wealth. The paper suggests instead that the introduction of shares played an important role in generating this coalition. Shares aligned the incentives for disparate groups by providing all with a chance to share in future opportunities for profit and commercial expansion overseas. By emphasising the importance of the issuance of shares in fostering political reform, the paper suggests new lessons from England's experience for fostering political development in contemporary settings.

Finally, the paper contributes to a prominent literature that argues that countries with common law legal origins enjoy better investor protections that encourage diffuse corporate ownership (La Porta, Lopez-de Silanes, Shleifer and Vishny 1998, Roe 2003). This paper documents that in England, the originating nation of the common law tradition, the causal relationship also went in the opposite direction: the diffusion of share ownership encouraged constitutional reform and improved legal protections overseas. The positive feedback seen in England between diffuse corporate ownership, representative government and legal protections suggests an answer to why nations that transplant only one of these institutions, such as the common law, often develop along very different

also Greif (2005).

trajectories.

Section 2 briefly sketches the relevant constitutional and commercial history of 17th century England. Section 3 describes the empirical methodology. Section 4 describes the data while Section 5 presents the main empirical results. Finally, Section 6 discusses the findings and the lessons they provide for contemporary settings.

2 Historical context

This section gives the contextual basis necessary to motivate the empirical strategy and interpretation used in the paper. First, the section describes how Drake’s remarkable circumnavigation around the world provided an important but temporary boost to the propensity to invest in shares in overseas joint-stock ventures in England; this will play a useful role for empirically identifying the effect of shareholding on political reform. Next, the section tabulates why these joint-stock ventures failed prior to the Civil War, emphasising the role in these failures of the monarch’s constitutional control over overseas investments. The section highlights the monarch’s relative lack of discretion over domestic property and contrasts this with evidence that the executive was exploiting these overseas rights to increasingly live without parliamentary oversight. The section describes attempts by a broad coalition to wrest control of the monarch’s overseas rights, first through parliamentary means and ultimately through Civil War. Finally the section describes the constitutional changes that occurred, and documents the massive increase in overseas public investments in the Royal Navy that supported England’s subsequent expansion and growth.

In September 1580, the *Pelican*, the sole survivor of a fleet of five ships that had sailed three years earlier, moored at Plymouth harbour in England.³ Her captain, Francis Drake, had achieved an unlikely success— the circumnavigation of the world and direct trade with the Spice Islands of the Pacific. Drake’s voyage and the charts of

³The *Pelican* later gained further fame under her new name: the *Golden Hind*.

ports, watering places and trade routes that he constructed meant that for the first time English traders could break into Portuguese and Spanish monopolies in Eastern trades (Andrews 1967). Not only did Drake's voyage change the feasibility of English trade, it also amply demonstrated the scale of profits to be had from trade and plunder. Knighted by Elizabeth I, Drake's extraordinary achievement made him a national hero.

A generation of Englishmen was inspired by Drake's voyage to invest in endeavours overseas (Andrews 1967). As the Spanish Ambassador, Bernardino de Mendoza, reported to his king a few days after Drake's return: "At present there is hardly an Englishman who is not talking of undertaking the voyage, so encouraged are they by Drake's return . . . everybody wants a share in the [next] expedition. . . (Rabb 1967)[pg.20]" This sentiment was not confined to London or a small elite group. As a clergyman in the town of Exeter, Thomas Hooker, wrote in 1585, Drake's exploits:

inflamed the whole country with a desire to adventure unto the seas, in hope of like success, [so] that a great number prepared ships, mariners and soldiers and travelled every place where any profit might be had . . . (Andrews 1964)[pg.4].

As Figure 1 suggests, there was an important but temporary boost to the propensity to invest in shares overseas among those MPs who entered adulthood (and thus became legally and financially independent) during and closer in time to Drake's remarkable exploits. Notice that the propensity to invest falls among those who became adults later. As discussed below, this reflects the failure of most of these joint stock companies to make a profit. Thus, the shock from Drake's voyages was temporary, and concentrated most on the generation that witnessed his return. As Section 3 discusses, controlling for other means by which age differences may be important, this differential shock to MPs who became adults closer in time to the peak of nationwide enthusiasm for overseas investment due to Drake's voyages can be used to identify the effect of shareholding on support for political reform.

Though the potential profits to be had overseas were large, English investors over-

seas faced two key problems that meant that virtually none of the joint-stock companies made profits prior to the English Civil War. Table 1 summarises the position of the major English joint-stock companies on the eve of the Long Parliament (1640). As Table 1 suggests, the first problem was that the Spanish and Portuguese, and later the Dutch, had organised national defences of their lucrative monopolies over Atlantic and East Asian trade and violently resisted English entry. English merchants were forced to trade with the New World, indirectly, through Spain and Portugal. Without a more aggressive foreign policy providing support for those seeking to break Spanish and Portuguese monopolies overseas, London was unlikely to emerge as anything more than a regional centre of trade and commerce.

The second problem was that the right to declare war and, in fact all rights to overseas commerce and territory were owned by the King. Unlike domestic property rights, which were governed by the common law, and were relatively secure from Crown expropriation, foreign trade in early modern England was governed by civil law, administered by the Crown in the Admiralty courts.⁴ Prior to the Civil War, English rulers also had the right to revise customs rates and “impose” customs upon newly-introduced goods, as commerce was believed to be protected and maintained by the king’s foreign policy (Gras 1912).⁵ Though limited by both legal institutions and parliament in his ability to expropriate

⁴Domestic property rights were governed by the common law, a set of precedents that put limits on the Crown’s ability to influence domestic judicial decisions (Burgess 1992). Along with access to a jury of their peers, wealth holders were themselves responsible for local enforcement and for collecting taxes. They often refused to cooperate with the Crown bureaucracy. Compared to other contemporary states, the monarch’s ability to expropriate wealth through courts or via taxation in early Stuart England was remarkably light. There was flagrant tax-evasion, particularly in response to policies wealth-holders did not support. As Sir Walter Raleigh admitted in 1601: “our estates that be £30 or £40 in the Queen’s books are not the hundredth part of our wealth.” (Smith 1999).

⁵As the judge, Sir Henry Yelverton is noted as stating in parliament in 1610 (precedents from previous parliaments that he referred to are in parentheses):

Impositions may be layd upon merchant strangers (13 E 4). But the merchants of England trade not by the comon lawe of the land, but by the lawe of nations . . .

We are where the common lawe cannot judge. The merchant hathe no remedy agaynst hym that spoyles at sea. He is not under the protection of the lawe, thoe under the protection of the King . . . He is under the jurisdiction of the King by the lawe of nations, (6 R 2), Protection. (Gardiner, ed 1862)[pg.87]

wealth within the country, the king's prerogative was firmly established beyond England's coasts.⁶

Sovereignty rights over war, colonies and customs enabled the Stuart kings, James I and Charles I, to extract much of the residual gains from England's emerging commerce overseas. As Table 1 suggests, those joint stock companies that were not targeted by foreign attacks and enjoyed temporary profits soon lost these profit sources through the assertion of the Crowns' sovereignty rights—either through rising customs charges or the revocation of their charters.⁷

In contrast, as Figure 2 reveals, overseas customs revenue accruing to the Crown rose from insignificance to providing the majority of Crown revenues on the eve of the Civil War. In fact, the combination of a peaceful foreign policy and the accompanying rise in customs revenue from England's indirect trade with the New World through Spanish and Portuguese ports were allowing the king increasingly to live independent of Parliament. Both James I (1603-25) and Charles I (1625-1648) succeeded in living without Parliamentary subsidy for 11-year periods (Smith 1999). Customs revenue meant that England's kings, though still relatively poor and weak in their ability to extract resources domestically, were becoming increasingly enriched over time.⁸

Attempts to bargain over the control over rights over customs and foreign policy

⁶Overseas rights also included control over innovation. At this time, most technical progress was occurring outside England, particularly in the more advanced centres of France, the United Provinces and Venice (Rapp 1975). Thus introduction of “new industries”, such as cannon-founding, sugar-refining, soap and papermaking, into England was considered a component of foreign policy, and the king had the prerogative right to assign monopoly patents and thus derive revenues in lieu of what he might have received in customs. An important example of the king's prerogative role in industry is *Alderman Cockayne's Project*—an attempt by James I in 1614 to dye and dress English cloth domestically. At this time, such “finishing” was being done in Holland. The Cockayne project collapsed when the Dutch responded by embargoing English traders—another instance where foreign policy was critical for economic development in this period.

⁷Not surprisingly, then, the probate records of individuals' estates reveal no discernable evidence that the wealth of the business community in England rose in any part of the distribution until the trade boom of the 1660s, after the Civil War (Grassby 1970).

⁸That the monarch was the major beneficiary of expanded overseas trade, and no measurable rise in mercantile wealth occurred until after the Civil War suggests that the process of enrichment of Atlantic traders suggested by Acemoglu et al. (2005b), while potentially playing a role in creating a constituency for reform during the Glorious Revolution, is unlikely to have played that role in the Civil War.

played a pivotal role in Parliamentary debates from 1603 to 1625 (Ashton 1967, Rabb 1998). These culminated in the “Great Contract” of 1611, an attempt to exchange the king’s authority over independent means of revenue in exchange for assured parliamentary grants of direct taxes. Bargaining foundered, however, chiefly because parliament wanted control over customs, and the king was counselled not to surrender “the fairest flowers for profit and command in all his garland (Hill 1961).”

Though his resources were growing, a simultaneous shock due to invasion by the Scots and rebellion by the Irish was sufficient to overwhelm the king’s finances and, in a position of weakness, he was forced to summon the Long Parliament of 1640. Members of the Long Parliament, in different subsets, sat as England’s representatives for the next 20 years. During this time, England underwent a dramatic institutional transformation.

The institutional changes of the Long Parliament began before the Civil War with the passage of the Triennial Act in 1641, guaranteeing that parliament must be called at least every three years and could not be dismissed without its own consent. The royal prerogative courts were also abolished and Parliament passed bills that deposed the king’s chief councillors, seeking control over future appointments. Ultimately, attempts to institute parliamentary authority over remaining Crown rights, including over foreign policy, finance and the armed forces led the king to raise his war banner in 1642 in defense of his prerogative.⁹

In combination with other financial reforms, Parliamentary control of the customs revenue flowing through London enabled it to out-spend the king during the Civil War and played a crucial role in bringing about a parliamentary victory by 1648 (Rodger 2004).

⁹As Charles I himself later provides as his reason for going to war:

For although I can be content to eclipse my own beams to satisfy their fears . . . yet I will never consent to put out the sun of sovereignty to all posterity and succeeding kings, whose just recovery of their rights from unjust usurpations and extortions shall never be prejudiced or obstructed by any act of mine . . . (Charles I and Gauden 1649)[pp.48-49]

This description appears to match the condition for the failure of the Political Coase Theorem outlined by Fearon (1996), who shows how nations may rationally choose to engage in costly conflict rather than bargain away features whose sacrifice might lead to a discontinuous loss to the nation’s subsequent bargaining position.

As Figure 3 suggests, during and after this period, England began a remarkable naval buildup. As Figure 4 shows, at the end of the Civil War, the Royal Navy was unremarkable relative to its rivals. However, in 1648, England's new rulers—the “Rump” Parliament of victors of the Civil War—immediately embarked upon a series of foreign policy initiatives designed to wrest control of overseas commerce. These initiatives, including the Navigation Acts and wars with the Dutch and Spanish, paved the way for a boom in English overseas trade that began in the 1660s (Davis 1973). By the end of the 17th century, England's position as the pre-eminent naval power of Europe, which it would maintain for the next two centuries, was assured.

The constitution of England also had been transformed. Charles II was “restored” to a much diminished throne in 1660. The King was forced to affirm all laws passed by the Long Parliament prior to the Civil War. Since Parliament controlled the state finances, Crown policies disagreeable to Parliament, such as treaties with France, had to be conducted in secret and lacked credibility. Thus foreign policy remained consistent following the Restoration, with re-affirmation of the Navigation Acts and continued commercial wars with the Dutch. Intermittent attempts by the monarch to reassert independent authority continued until Parliament's increased executive control was made explicit following the Glorious Revolution of 1688. By 1714, George I of Hanover, 57th in line to the throne and lacking a working knowledge of English, was anointed more by the Settlement Act, enacted by Parliament in 1701, than by God.

By 1714, Britain had already begun to assume the role of market hub for a trading empire spanning the world. Amsterdam, the hub of Atlantic trade through much of the late 17th century, was already being reduced to re-exporting goods entering British ports (Ormrod 2003, O'Brien 1988). While the empires of Spain and Portugal entered long-term decline, in part due to British predation, and France was heading toward increased executive control, Britain was on a trajectory toward a commercial and colonial empire abroad and industrial development and the makings of liberal democracy at home.

3 Empirical methodology

The English Civil War began as a struggle between monarchy and members of the Long Parliament over control over the “prerogative”: the rights of the executive. Thus theories about the motivation, organisation or identity of groups responsible for England’s political struggle should find validation in the observable history of who supported and opposed the monarchy in Westminster. A particularly valuable feature of using data from the Long Parliament is that the allegiances—to Parliamentary control of government or to the monarch—of virtually all members were publicly revealed by their actions during the Civil War. Parliamentary fence-sitters on the eve of the Civil War were forced to choose between staying in London or attending the “Oxford Parliament” summoned by the King. By 1644, every living parliamentarian could be associated with one side or another (Brunton and Pennington 1954).¹⁰

A simple model can shed light on how to interpret the relationship between endowments, property rights and political choices. Suppose that the expected utility for a member of parliament (MP) can be summarised by the following additive relationship:

$$U_i = \sum_j \beta_j x_{ij} + u_r \tag{1}$$

where x_{ij} are predetermined individual endowments, β_j represent the rates of return to x_{ij} and u_r contains other orthogonal factors that influence expected utility in a state of the world r , that are potentially correlated among representatives of the same county, but independent between them. Suppose that the support of an individual agent increases the chances of victory by an amount $s > 0$. Suppose that each agent believes that with probability μ , Parliament (P) will win the struggle against Royal authority (R).¹¹ Let

¹⁰The widespread knowledge of the allegiances of Parliamentarians differs from other public figures; the loyalties of other leaders, such as the leaders of towns and counties, are confounded by both local power politics and the presence of whichever army happened to be present at the time. Even London, often seen as the epicenter of Parliamentary power, initially had a strong Royalist presence among its leadership, including a Royalist Lord Mayor.

¹¹Naturally, we expect μ to be affected by other agents’ choices. For plausible specifications of the

$\beta_z, z \in \{P, R\}$ denote the rate of return on endowment j in the state of the world where either the monarchy (R) or Parliament (P) won. Then the agent's problem is to choose to support parliamentary or monarchical control:

$$\max_{z \in \{P, R\}} \left[(\mu + s) \left(\sum_j x_{ij} \beta_{j|P} + u_P \right) + (1 - \mu - s) \left(\sum_j x_{ij} \beta_{j|R} + u_R \right), \right. \\ \left. (\mu - s) \left(\sum_j x_{ij} \beta_{j|P} + u_P \right) + (1 - \mu + s) \left(\sum_j x_{ij} \beta_{j|R} + u_R \right) \right]$$

The optimal choice implies a cut-off strategy: an agent will choose to support Parliament if the value from supporting Parliament exceeds that of supporting the monarchy. Subtracting the values above reveals that an agent will choose to support political reform if:

$$s \left(\sum_j x_{ij} [\beta_{j|P} - \beta_{j|R}] + (u_P - u_R) \right) > 0 \quad (2)$$

The inequality (2) establishes that, given the linear utility specification above, a sufficient condition for an agent's decision to support political reform to be invariant to the agent's exposure to any particular endowment x_{ij} is that $\beta_{j|P} = \beta_{j|R}$. In other words, support for political reform will be unaffected by an endowment if the value of that endowment is the same regardless of regime. This will occur when there are believed to be secure property rights for that endowment.¹²

The inequality (2) also implies that those endowments that play the biggest role in determining an MP's support or opposition to political reform will be those most subject to change in value based on the identity of the regime. As Section 2 discusses, these are

multi-agent game, we would expect multiple values of μ to be consistent with equilibrium. However, as shown below, the specific realisation of μ is irrelevant for an agent's decision, as long as $\mu \pm s$ is interior. This condition: that there is some uncertainty about whether Parliament or monarchy wins regardless of an individual agent's choices— makes sense in the historical context.

¹²In this setup, the condition above is in fact also necessary for irrelevance of an endowment if MPs believe that their choice will have a non-zero effect on the outcome ($s > 0$). This condition lends itself to an empirical test: if $s = 0$, it implies that all endowments are irrelevant at the same time, and thus a joint test of the significance of all endowments should be zero. The regressions below are sufficiently significant to reject this test.

likely to be endowments linked to overseas opportunities, trade and royal patronage, all of which fell within the “prerogative” rights of the king. All of these could be expected to change with Parliament’s seizure of control over these rights.

Inequality (2) further yields an implicit condition on the minimum $u_P - u_R$ required for support for Parliamentary control. The probability of supporting Parliament is:

$$\mathbb{P}\{P\} = F\left(\sum_j s x_{ij} [\beta_{j|P} - \beta_{j|R}]\right) \quad (3)$$

where $F(\cdot)$ is the cumulative density function of $u_P - u_R$. Assuming that u_z are normal or uniform, Equation (3) can be estimated using standard probit or OLS respectively. The coefficients γ_j from such a regression identify $\gamma_j = s(\beta_{j|P} - \beta_{j|R})$. Note that s cannot be identified, but must be non-negative.¹³ Thus, we can make inferences on the sign of expected changes in the value of the endowment by inspecting the coefficients, but need to rely on marginal effects to assess the relative magnitude of such changes.

The empirical section will provide estimates of Equation (3) and, in particular, measure the effect of prior shareholding in overseas companies on support for political reform. If, as Section II suggests, investments overseas were most subject to executive discretion and most likely to be encouraged under the new regime, then a relatively larger effect of shareholding on the decision to support increased parliamentary control should be expected. Furthermore, to test whether shareholding aligned incentives of disparate groups, a comparison can be made of the effect for merchants and non-merchants. If shareholding aligned incentives for non-merchants to support political reforms in order to pursue overseas opportunities, then a greater effect of shareholding on reform for non-traders should be expected than for those with mercantile backgrounds, who could already invest

¹³In this simple specification, s is assumed to be the same for each agent. In a more general specification, we could imagine that an agent’s effect on the outcome of political struggle is a function of his endowments, and make s a function of X_{ij} . As long as the effect of support does not depend on whether the agent supports the royalists or parliament and is distributed independently conditional on X_{ij} , this generalisation would change the structural interpretation of the coefficients γ_j , but not effect the sign or irrelevance conditions described above, and we can still make inference on the marginal effects.

overseas in the absence of shares.

Equation (3) will be estimated under two sets of assumptions. First, assuming that the selection of shareholders was uncorrelated with subsequent political decisionmaking, estimates can be made of the average “treatment” effect of shareholding on support for political reform among shareholders. This assumption would be violated if investors possessed other endowments, such as greater wealth, that made them more likely to support political reform. Thus shareholders are matched along a rich range of endowments that have been mooted as being relevant for encouraging political reform, including endowments of old and recent wealth, court patronage and religion as well as constituency and regional preferences.

It may be however, that even conditional upon these controls, investors in shares were different in a way that may bias the results. One plausible reason may be that shareholding may reflect unobserved differences in wealth, and it is a common interest in protecting domestic property that is driving the results. An alternative might be that shareholding reflects a higher risk preference and those that invested overseas were also more likely to risk political reform. Both of these alternatives would bias the results from direct matching upward.

The second approach relaxes the assumption that the selection of shareholders was uncorrelated with subsequent political decisions, and instead uses the number of years after Drake’s voyage in 1585 that an MP came of age as an instrument for shareholding. As Figure 1 reveals, Drake’s circumnavigation in 1577-80 and subsequent successful raid on the Spanish treasure fleet in 1585 (the only such English success, despite many subsequent attempts) did indeed act as a shock to the propensity to invest in joint stock by the cohort of Long Parliament MPs who became adults (and thus legally and financially independent) at this time. The effect diminishes almost monotonically among subsequent generations, however, reflecting the failure of these ventures to make profits. Though the *investment* in new joint stock companies for the most part did not take place un-

til after 1600, the *investors* in these companies were disproportionately drawn from the generation that witnessed Drake’s return.¹⁴

The variation in the propensity to invest by Long Parliament MPs who became adults closer to the time of Drake’s voyages can be exploited in order to evaluate the importance of selection in influencing shareholder’s decisions to support political reform. The instrument will violate the exclusion restriction if the number of years an MP came of age after 1585 has other effects on the decision to support political reform than through the propensity to invest in shares. It could be that older individuals came into inheritances and thus gained wealth that they sought to protect. It could also be the case that increased share investment by individuals who came of age closer to Drake’s voyage reflects the fact that merchant MPs tended to lack access to family seats and thus were older when they came to Parliament and also have foreign interests, and it is a “bourgeois” effect that is driving these results.

To address the former concerns, controls are added for whether the MP was over 30 at the beginning of the Long Parliament and whether the MP was the oldest surviving child, and thus the heir. To address the latter, controls are added for existing mercantile interests and broad range of other differences in endowments.¹⁵ This strategy allows estimation of the local average treatment effect (LATE): the effect of shareholding on support for political reform among those MPs who invested in shares because they became adults nearer in time to Drake’s voyages, and otherwise would not have invested.

Use of the instrumental variables strategy addresses another concern: that part of the effect of shareholding comes from the *opportunity* a large group of individuals gained to invest overseas and a substantial part of this effect may be missed by using as an

¹⁴Figure 1 also reveals that only one of those who came of age *prior* to Drake’s capture of the Spanish fleet in 1585 was an investor: the eldest in our sample, Sir Francis Knollys. He was 92 at the start of the Long Parliament (1640).

¹⁵Implementing a regression discontinuity design through the addition of linear and quadratic controls for age leads to similar results in a number of specifications, though these results are less robust as they depend on the 5 MPs who came of age before 1585 to identify a separate age trend. It is also unclear why there should be such a discontinuity among those who came of age before 1585.

indicator those who *actually invested* before the Long Parliament. Many individuals may have been motivated to support political reforms by the opportunity of benefiting from overseas expansion who had not actually made such an investment, but intended to take advantage of investment overseas upon wresting control from the Crown.¹⁶ Thus, while biases due to unobserved differences in wealth and risk preferences would mean that the IV estimates of the effect of shareholding on support for political reform are lower than the OLS estimates, substantial measurement error may induce the IV estimates to be larger.

4 Data

As summarised in Table 2, the data for this study was collected from a number of different primary and secondary sources. First, biographies of each member of the Long Parliament, drawing in particular from compilations by Keeler (1954), Brunton and Pennington (1954), the History of Parliament Trust (forthcoming) and the Dictionary of National Biography (2007), were used to construct a range of variables, including parliamentary allegiances, inherited wealth, rank and mercantile interests, and estimates of wealth from probate records and compounding fines.¹⁷

Each individual, and their father and father-in-law, were matched to the data on trading interests from Rabb's (1967) lists of all investors in overseas companies mentioned in the founding charters, patent rolls and subsequent transfer books of the major overseas trading companies founded in England between 1575 and 1630. In total, Rabb provides names of 6,336 investors mentioned during this period.¹⁸ These were further

¹⁶John Hampden, who refused to pay Ship Money at the instigation of the Providence Island company, and Oliver Cromwell, who considered immigrating to Massachusetts, then under threat of losing its charter to the King, provide such examples.

¹⁷The House of Commons consisted of representatives of 249 constituencies including the chartered boroughs, the 59 counties and the Universities of Oxford and Cambridge. The franchise was limited to a relatively few affluent "burgesses" in towns and owners of freehold land worth 20 shillings a year in the counties (Cook and Wroughton 1980). Birth dates that were not known were imputed where possible from the individuals' entry into colleges, inns, completion of apprenticeships and dates of knighthoods.

¹⁸Some uncertainties about identity faced by Rabb were resolved. Other uncertainties stem mainly

supplemented and extended to 1640, where possible, using biographical information and the charters of the Saybrook and Providence Island companies.

Religion has played an important role in the historiography of the Civil War. To capture the effect of Puritanism, I use a combination of two proxies. First, I use biographical data to identify individuals who attended Puritan seminaries or colleges that had strong Puritan ties. For example, Emmanuel College, Cambridge was founded in 1584 by Sir Walter Mildmay in order to render “as many possible fit for the administration of the Divine Word and Sacraments.” (Porter 1958) [pg. 238]. An MP’s attendance at such institutions may be interpreted as an indicator of Puritan preferences. To capture religious preferences among those who did not attend such institutions, I also gathered data on active Puritan ministers and Catholic recusants in the area each MP represented from diocesan records collected in Usher (1910) and McGrath (1967).¹⁹

Parliamentary constituencies could be further matched to a rich set of geographical and other historical data to capture the impact of royal and noble influence on particular MPs, differences in the preferences of boroughs and counties, cities, towns and ports, as well as other forms of regional preferences. The sources of constituency data are also listed in Table 2.

5 Results

As the descriptive statistics in Table 3 reveal, shareholders constituted 21 percent of members of the Long Parliament. Of shareholders, 76 percent were investors in failed companies. Shareholders had similar wealth endowments to non-shareholders, including similar proportions of MPs who were heirs, inherited ties to the royal court, had fathers with titles or had inheritances of manors or any landed estate. MPs who had

from common names—Thomas Smith which should constitute pure measurement error. See Rabb (1967)[chp.3] for a detailed discussion of each company.

¹⁹These were at the ancient diocese level. To get estimates at the county level, a uniform distribution of ministers and recusants per population was assumed.

been educated in Puritan colleges or seminaries do not seem to have been more likely to invest. Shareholders do however differ in two salient dimensions. First, as expected, shareholder MPs came of age on average 8 years closer to the time of Drake's voyage to non-shareholders. Second, 23 percent of shareholder MPs came from mercantile backgrounds, compared to only 14 percent in the sample as a whole. As we shall demonstrate however, the effect of shareholding comes largely from those without existing mercantile backgrounds.

Despite the broad similarities between the endowments of shareholders and non-shareholders, there are large differences in their political decisions. Three in four shareholder MPs supported the expansion of Parliamentary control in the Civil War, compared to around half of non-shareholders. Shareholder MPs were also more likely to make voluntary contributions to defend Parliament in London at the beginning of the war in 1642, and contributed greater amounts on average.

It may be that the large differences visible in the comparison of means between shareholders and non-shareholders are due to other endowments that shareholders may have possessed. Yet, as Columns 1 and 3 of Table 4 reveal, the average treatment effect of shareholding on increasing the probability of support for Parliamentary control among shareholders is around 16 percent, even comparing individuals of similar wealth, patronage and religious backgrounds.

Consistent with the theoretical framework, the other individual endowments that show strong effects on support or opposition to political reform are those over which the executive wielded discretion before the Civil War: mercantile interests and court patronage. In contrast, a range of measures of endowments of domestic wealth, including the MP's status as an heir, inheritance of large manorial or any landed estates and the titles of the MP's father have little effect. There is also no evidence to support the theory that MPs from families of "emergent gentry" who acquired land during and after the reign of the Tudors were more likely to support Parliamentary control. These results

instead suggest that support of political reform was unaffected by endowments of new or old wealth, and that domestic property rights were indeed secure in 17th century England.

Another important interpretation of the Civil War going back at least as far as Thomas Hobbes (1682) has emphasised the role of religion. Indeed, an effect of religion is consistent with the theoretical framework, since the kings of England had possessed prerogative control over the newly-formed Anglican Church ever since the Reformation. It may also have been the case that joint-stock investment was motivated by Puritan notions of capitalism and thus the effect of shareholding is really capturing religious motivations for the struggle between Crown and Parliament (Tawney 1926). Columns 1 and 3 of Table 4 shows that the effect of shareholding is robust to controlling for whether an MP had been educated at a Puritan seminary or college, and for the prevalence of Puritan ministers in the MP's constituency.²⁰

It could be that MPs' support for Parliamentary control was shaped more by the interests of their constituency than by their individual investments in shares. Indeed, it may be that the effect of shareholding may be simply capturing the fact that shareholder MPs were more likely to represent towns or ports newly-enriched by Atlantic trade. However, adding a range of controls for constituencies of representation has little effect on the coefficient of shareholding, and there is no evidence that MPs representing towns or ports were more likely to support Parliamentary control (Columns 2, 4 and 5).

Another possibility is that the effect of shareholding is capturing the preferences of

²⁰Recent accounts revive the view that the "Puritan Revolution" was motivated by religious differences, seeing the Civil War as a skirmish in the broader Wars of Religion (Morrill 1993). While important, it is unlikely that religious conflict can explain the entire story. As the Grand Remonstrance suggests, MPs favoured a "profitable" war in the Spanish West Indies instead of direct conflict with Catholic Spain. Religion was also seen as an effective propaganda tool. As the contemporary lawyer and MP, John Selden, wrote:

the very *Arcanum* of pretending religion in all wars is that something may be found out in which all men may have interest. In this the groom has as much interest as the lord. Were it for land, one has one thousand acres and the other but one; he would not venture so far as he that has a thousand. But religion is equal to both. Had all men land alike, then all men would say they fought for land (Hill 1961)[pg. 105].

MPs who represented dense populated counties or regions, such as East Anglia, that had different legacies of law and institutions from the medieval period that made them more likely to support Parliamentary control (Fischer 1989). However, adding controls for the region of representation does not appear to influence the effect of shareholding (Column 5).

Columns 6-8 of Table 4 present results relaxing the assumption that the selection of shareholders was uncorrelated with subsequent support for reform, using variation in the difference in years from Drake's major exploits and an MP's age of majority as an instrument for an MP's decision to invest in shares. As the F-tests in the bottom panel of Table 4 reveal, the excluded instrument exhibits sufficiently strong residual correlation across specifications to allay fears of weak instrument pathologies (Staiger and Stock 1997). Further, as the Table shows, the exogeneity tests are inconclusive, with the exogeneity of shareholding rejected at between 10 percent and 20 percent confidence.

However the IV estimates are considerably larger in magnitude than OLS: share investment by MPs who invested because they came of age near the time of Drake's voyages increases the probability of supporting Parliamentary control by around 75 percent, and is robust to changes in specification. This dramatic increase in the magnitude of the effect is consistent with significant error in using those who actually invested in shares as a measure for those for whom shares provided an opportunity for future investment overseas. The increase in magnitude of the IV estimates suggests that the downward bias due to measurement error has a greater effect on the OLS results than upward biases due to unobserved differences in wealth or risk preferences.

Even though there is no significant effect of a range of measures of domestic wealth on support for political reform, it still might be the case that insecure domestic property rights were crucial in the decisions of agents to support political reform and that the effect of shareholding occurs not through the alignment of interests across groups in favour of control over sovereignty rights, but rather due to a desire to protect wealth that share-

holders acquired through investments in profitable companies. Table 5 (Panel A) restricts the measurement of the effect of shareholding on support for political reform to those who invested in companies that were unprofitable prior to the Long Parliament. Though slightly weaker in magnitude, the effect of shareholding persists across specifications.

Table 5 (Panel B) compares the effect of shareholding on those with existing mercantile backgrounds and those without. If it is the case that the introduction of shares aligned incentives in favour of control over overseas rights among who otherwise had no such interest, we should see a greater effect on those without mercantile interests than on traders, who could already benefit from overseas trade on their own account and thus had an existing interest in political reform. Indeed, we find that the effect of shareholding on non-merchants increases their probability of supporting political reform by around 20 percent while having a limited effect on those with existing mercantile interests overseas. The differential effect on merchants is robust to matching on constituency and region preferences and to restricting to investors in failed companies. However, merchants who invested in shares due to Drake's voyages appeared to be as willing to favour political reform as non-merchants.

Table 6 presents results showing the effect of shareholding on the probability of providing a voluntary loan to defend Parliament against the monarch in 1642. Interpreting this measure of support for Parliamentary control differs from the previous regression in that a negative effect on an endowment does not imply support for monarchical control, but rather a lack of systematic support for Parliament. Consistent with the previous results, however, shareholders were significantly more likely to provide loans to Parliament, and the effects were larger among those who invested due to Drake's voyages. Once again, merchant-investors were less likely to offer such loans.

It still could be the case that shareholders, whether in failed companies or otherwise, were in fact more wealthy, and the controls and IV strategy are not adequately capturing this variation in wealth. It could also be that the measures of endowed domestic wealth

are simply not precise, and lack of precision, rather than strength of property rights is responsible for a lack of an effect on support for reform. Table 7 tests whether these endowment measures have any effect on that subsample for which measures exist of an MP's income at the time of the Civil War. While there is no consistent evidence that shareholders had more income than average, and no evidence at all when IV estimation is used to account for selection, Table 7 shows that inheritances of landed estates, large manorial estates, and titles are all strong determinants of contemporaneous income. This suggests that shareholders were not in fact richer, once endowed wealth is held constant and selection addressed, and our measures of endowed wealth do capture important variation in contemporary income.

It still could be possible that the effect of shareholding due to Drake's voyage is capturing unobserved pre-existing differences in political allegiances that led individuals to oppose the Court. This would suggest that in the years before the Civil War, such anti-monarch shareholders would be also less likely to attend court or work for the Crown. In contrast, if the theoretical framework above is correct, then prior to the stark decision to support or oppose constitutional reform in the Civil War, individuals with endowments most subject to executive control, including shareholders, would paradoxically face a *greater* incentive to secure their property through investing in client relations with the Royal court. Table 8 examines the effect of shareholding due to Drake's voyage on the acquisition of court positions. Here the potential for endogeneity is significant: some courtiers may have invested in joint stock since they had more access to royal charters and royal patronage, or alternatively, the ruler may have attempted to buy off the most recalcitrant members of his opposition. However as the IV specifications reveal, shareholders who invested overseas due to Drake's voyages were more likely to acquire court positions, with a greater effect for non-merchants than for those with existing trading interests (Table 8: Columns 3-4, 7-8). Thus, it appears that shareholders did make attempts to work within the existing constitutional system to secure overseas property:

prior to the Civil War, shareholders were not consistently opposed to the Court, and many assumed court roles.²¹ In contrast, there seems to be no evidence that those endowed with domestic property were more likely to cultivate new ties to court, suggesting again that these rights were secure.

6 Discussion

This paper has sought to establish that shareholding in joint stock companies aligned incentives for support of political reform across disparate groups. Furthermore it is possible that these companies also played a key role in *organising* the emergent coalition. Joint-stock companies in early modern England were governed by a court of directors selected by a system of voting in proportion to the value of each investors' shares (Scott 1912). Through this system of elected delegation, large joint stock ventures may have facilitated the selection of political opposition leaders. In fact, the leaders of dissent in the early Stuart Parliaments include the Earl of Southampton and Sir Edwin Sandys, who were first brought together while serving as directors of the Virginia and Bermuda companies (Rabb 1998) (Hill 1961)[pg.32]. Similarly, the leaders of the Parliamentary opposition during the Long Parliament—John Pym and Oliver Saint John in the House of Commons, and the Earl of Warwick and Lord Saye and Sele in the Lords—were prominent in the leadership of the Providence Island company, which fought its own privateering war against Spain until 1635 (Hill 1961).²²

Joint-stock companies may have also begun to be seen as a viable replacement for executive authority and finance over war as well. In 1625, rather than rely on the official

²¹Indeed, the historical record suggests that a high degree of collegiality between monarch and parliament could exist when the monarch seemed ready to cede prerogative control over foreign policy to Parliament, as occurred in 1624 (Smith 1999). Charles, in concert with parliament, was explicitly willing to tie parliamentary grants of taxation to the declaration of war with Spain. In this session of Parliament, 35 statutes were passed as opposed to only one in 1621.

²²In fact the contemporary newssheet *Mercuricus Civicus* claimed that the entire Civil War was a plot hatched by the Providence Island company. Though an extreme interpretation, it is still indicative of contemporary perceptions.

Navy, a joint stock company was formed to mount a naval expedition against North African “Barbary” raiders. That same year, Sir Dudley Digges tabled a motion in the House calling for “ War at Sea [against Spain], for Defense and Offense, by the voluntary joint Stock of Adventurers out of all Counties of England; to be encouraged by a settled Course in Parliament, and by Privileges to be granted to them, without much Prejudice to his Majesty’s settled Revenue” (Mitchell 1957). On the eve of the Civil War, rather than following the custom of granting the King money to deal with external threats, parliamentary leaders financed the campaign against Irish rebels by issuing shares, with confiscated lands providing the potential profits (Scott 1910).

The role of shareholding in aligning incentives may have gained even more importance after the Civil War, when England embarked on a remarkable expansion of her Navy and an aggressive foreign policy in support of commerce. Post-Civil War England did not become a merchant oligarchy that class-based interpretations, which view the Civil War as a victory of merchants or “new merchants”, would suggest.²³ Instead, a broad consensus spanning both non-merchant and merchant circles began to emerge both that England should pursue an aggressive (and expensive) naval and foreign policy expansion and that ultimate control over national policy should remain under the control of Parliament, not the monarch. The 1688 Revolution was later called “Glorious” precisely because it was virtually uncontested— England witnessed almost no bloodshed, particularly when compared to the estimated 190,000 deaths due to war and war-related disease in the Civil War. James II could find little support within England for his attempts to re-assert independent monarchical authority and was forced to flee. The subsequent consolidation of Parliamentary control led to a boom in public finance of England’s wars (Stasavage 2003).

It is likely that the development of active stockmarkets that occurred between the

²³An illuminating work in this vein is Brenner (1993). In common with this paper, Brenner stresses the importance of Crown property rights overseas in determining mercantile support for reform. However, he sheds less light on the issue of coalition formation that concerns us.

Civil War and Glorious Revolution (Carlos, Key and Dupree 1998) allowed both the winners and losers of the reforms to reallocate their portfolios in favour of those investments benefiting from an assertive foreign policy, and thus new coalitions that spanned a large number of initially disparate interests could be amassed. Thus, England's government remained that of the wealthy, but not a stable subsection of the wealthy, nor was it closed to entrants.²⁴ The new Whig and Tory political parties that formed between the Civil War and Glorious Revolution were forged around new coalitions that transcended old landowner-merchant distinctions and instead bargained over the particularities of the burdens of state finance and the direction of particular policies (Stasavage 2003). It is likely that the emergence of secondary markets in shares weakened the link between endowments and opposition to political reform. Thus, rather than becoming an oligarchy of overseas investors, post-Civil War England began a gradual process towards broadly representative government and, ultimately, democracy.

The creation of joint stock companies has been neglected in modern strategies for political development, which tend to emphasise the creation of a middle class or the development of "civil society". The distribution of shares that allow individuals to benefit from natural resources or new foreign opportunities may, however, provide an effective means to align incentives across disparate social and ethnic groups in favour of beneficial public policies. The fostering of secondary financial markets in shares may serve an important role in enabling the transfers that weaken the link between endowments and political opposition to growth.²⁵ England's transition to representative government in the 17th century may yet yield important clues to fostering political development and growth today.

²⁴The post-Civil War history of the major joint stock companies—the East India company, the Royal Africa company, the Bank of England and the South Sea company—is a history of companies issuing new stock to accommodate new MPs in Parliament. See Scott (1912).

²⁵In England itself, the access of landowner-MPs to non-agricultural investments may have been instrumental in the repeal of the protectionist Corn Laws in 1846 (Schonhardt-Bailey 1991).

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Table 1: Major overseas joint-stock companies, 1575-1640 and their representations in the Long Parliament

Name	Chartered/ formed	Members+	Investors in Long Parliament (1640)			Profitable?*	Foreign attacks?	Royal intervention
			Self	Father	Father in-law			
<u>East Indies</u>								
Drake's circumnavigation	1577	8	0	1	0	Yes	Spanish	Elizabeth major beneficiary
Cavendish's ventures	1586	4	0	0	0	No	Spanish	
East India Co	1599	1318	23	38	38	Initially	Dutch	Crown raises customs
Courteen's East Indies Co	1635	7	2	0	2	No	Dutch	Charles shareholder
<u>Africa trades</u>								
Senegal Adventurers	1588	22	0	1	1	Unknown	Portuguese	
Gynney & Bynney Co	1618	38	1	1	2	No	Portuguese	Charles shareholder
Nicholas Crispe & Co	1630	3	1	0	0	Yes	French, Dutch	Patentees were courtiers
<u>Central / South America incursion</u>								
Other privateering	1581	1051	28	22	17	No (on avg)	Spanish	
Guiana Co / Amazon Co	1584	105	7	9	12	No	Spanish	Raleigh executed (Spanish infl.)
Drake's 1587 voyage	1587	21	1	1	0	Yes	Spanish	Elizabeth shareholder
Fenton's voyage to Brazil	1592	42	0	2	1	No	Portuguese	
Bermuda Co	1612	177	2	8	13	Initially		Crown raises customs
Providence Island Co	1630	23	13	5	5	No	Spanish	
<u>New endeavours within Europe</u>								
Muscovy Co / Greenland Adv**	1555	211	3	3	4	Yes	Dutch	
Irish co (Munster & Londonderry)	1586	762	6	14	18	Yes		Charter revoked
Levant Co**	1592	572	9	14	14	Yes	Spanish, Barbary	Crown raises customs
<u>Northwest passage exploration</u>								
Frobisher's Voyages	1576	121	1	8	6	No		
Other NWP ventures	1584	311	3	21	20	No		
Hudson's NWP venture	1610	23	1	1	3	No		
<u>North America</u>								
Gilbert's enterprises	1578	147	1	4	3	No		
Gosnold's voyage	1602	5	0	0	1	Yes		
Weymouth's voyage	1605	5	0	1	1	Yes		
Other New England ventures***	1606	70	15	12	12	No		
Virginia Co (Roanoke)	1606 (1584)	1671	42	77	69	No		
Newfoundland/ N. Scotia / Canada Co	1610	58	7	0	4	No	French	Crown surrenders colonies
Baffin's NWP backers	1615	8	0	0	1	No		
Plymouth Co	1620	50	4	2	0	No		
Dorchester/ Massachusetts Bay Co	1623	123	13	1	0	No		Crown threatens charter

+ = Lower bound; * = Profitable for shareholders prior to Long Parliament; ** = switched to regulatory company structure upon confirmation of profitability; *** = Northern VA Co, New England Council and delegated patents, including Saybrook Co and Maine Exploration. For sources: see Appendix.

Table 2: Data sources

Variable	Original source	Secondary source
Individual data		
Straffordian	List posted in Westminster Yard	Brunton & Pennington (1954)
Member of parliamentary coalition	Commons lists (1642-48), Compounding Committee (1642-48)	Keeler (1954), Brunton & Pennington (1954), DNB (2007)
Sat in Rump Parliament (1648)	Commons lists (1642-48)	Brunton & Pennington (1954)
Sat in Cavalier Parliament	Commons lists (1642-48)	Brunton & Pennington (1954)
Proportion of compounding fine (for royalists)	Commons lists (1642-48), Compounding Committee (1642-48)	Keeler (1954)
Date of disablement from Parliament	Commons lists (1642-48)	Keeler (1954)
Loan for the Cause 1642	Commons lists (1642-48)	Keeler (1954)
Loan for the State 1640	Commons lists (1642-48)	Keeler (1954)
Holder of royal office	Biographies with multiple sources	Keeler (1954), DNB (2007), HPT
Investors in (failed) joint stock company	Charters (1575-1640), Company books (1575-1640)	Scott (1912), Rabb (1998), Keeler (1954), Willan (1968b)
Father investor in (failed) joint stock company	Charters (1575-1640), Company books (1575-1640)	Scott (1912), Rabb (1998), Keeler (1954), Willan (1968b)
Member of merchant guild/regulatory co.	Charters (1575-1640), Company books (1575-1640)	Scott (1912), Rabb (1998), Keeler (1954), Willan (1968b)
Heir	Biographies with multiple sources	Keeler (1954), DNB (2007), HPT
Inherited manors	Biographies with multiple sources	Keeler (1954), DNB (2007), HPT
Family wealth from land	Biographies with multiple sources	Keeler (1954), DNB (2007), HPT
Family wealth from commerce	Biographies with multiple sources	Keeler (1954), DNB (2007), HPT
Armigerous before Tudor dynasty	Biographies with multiple sources	Keeler (1954), DNB (2007), HPT
Father knight or baronet	Biographies with multiple sources	Keeler (1954), DNB (2007), HPT
Father noble	Biographies with multiple sources	Keeler (1954), DNB (2007), HPT
Age, Date of birth & death	Biographies with multiple sources	Keeler (1954), DNB (2007), HPT
Attended puritan college/seminary	Emmanuel & Sidney Sussex College & Lincolns Inn members lists	Keeler (1954), DNB (2007)
Constituency data		
Borough	Commons lists (1642-48)	Keeler (1954), DNB (2007)
Elizabethan port	Customs revenue lists (late 16C)	Willan (1968)
Town above 5000	Estimates: towns above 5000 in population (1600)	Wrigley (1985)
Puritan ministers	Diocesan records (1600)- assigned to county in ratio of area in diocese	Usher (1910)
In royal demesne	Traditional crown lands (in 1415)	Falkus and Gillingham (1987)
Castle in constituency	Castles extant in 1415	Falkus and Gillingham (1987)
Population of county	1834 enumeration abstract (estimates)	Rickman (1834), Wrigley and Schonfield
County / Borough wealth	Tudor lay subsidy assessments (1524-25, 1545)	Sheail (1998)
Number of taxpayers in constituency	Tudor lay subsidy assessments (1524-25, 1545)	Sheail (1998)

Abbreviations: HPT: History of Parliament Trust (forthcoming), DNB: Oxford Dictionary of National Biography

Table 3: Summary statistics

	Full sample			Non-shareholders		Shareholders	
	Obs	Mean	SD	Mean	SD	Mean	SD
Shareholder (before 1640)	548	0.21	0.41	-	-	1.00	0.00
Shareholder failed company	548	0.16	0.37	-	-	0.76	0.43
<u>Outcomes</u>							
Supporter of Parliamentary control	534	0.56	0.50	0.51	0.50	0.75	0.44
Contributor to London Defense	548	0.38	0.48	0.34	0.47	0.52	0.50
Amount for London Defense	547	103.77	228.06	90.05	222.39	155.30	242.36
Log(income) (wills/ fines)	270	6.79	1.16	6.72	1.12	7.11	1.29
Married into investor family	548	0.21	0.41	0.19	0.39	0.29	0.46
Received court office	548	0.26	0.44	0.24	0.43	0.33	0.47
<u>Individual endowment controls</u>							
Father investor	548	0.25	0.43	0.23	0.42	0.31	0.46
Inductee into merchant guild/ co.	548	0.14	0.35	0.11	0.32	0.23	0.42
Inherited landed estate	548	0.71	0.45	0.72	0.45	0.69	0.46
Inherited 3+ manors	548	0.33	0.47	0.33	0.47	0.34	0.47
Heir	545	0.73	0.44	0.74	0.44	0.71	0.45
Father noble	548	0.09	0.28	0.10	0.30	0.05	0.22
Father knight or baronet	548	0.35	0.48	0.35	0.48	0.34	0.48
Landed prior to Tudor dynasty	548	0.20	0.40	0.21	0.40	0.16	0.36
Inherited tie to royal court	548	0.28	0.45	0.28	0.45	0.29	0.46
<u>Religious endowment controls</u>							
Puritan education	548	0.16	0.37	0.16	0.36	0.16	0.37
Puritan ministers per 10000 in county	548	0.47	0.73	0.43	0.70	0.62	0.84
<u>Constituency controls</u>							
Borough constituency	548	0.82	0.38	0.83	0.37	0.78	0.41
Urban pop.> 5000 (1600)	548	0.10	0.30	0.09	0.28	0.16	0.36
Port (1603)	548	0.17	0.38	0.14	0.35	0.29	0.46
Atlantic port (1603)	548	0.03	0.17	0.01	0.10	0.11	0.32
Log. population density of county (1600)	548	4.45	0.40	4.42	0.31	4.60	0.59
Constituency within royal demesne (1415)	548	0.21	0.41	0.23	0.42	0.16	0.36
Royal/noble castle in constituency (1415)	548	0.07	0.26	0.07	0.26	0.08	0.27
Years of age after Drake (1585)	536	29.60	12.20	31.22	12.25	23.63	10.02

Table 4: Regression: supporter of Parliamentary control I

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Probit (dF/dX)	Probit (dF/dX)	OLS	OLS	OLS	2SLS	2SLS	2SLS
Shareholder in joint stock	0.172*** [0.051]	0.161*** [0.052]	0.159*** [0.046]	0.143*** [0.046]	0.146*** [0.043]	0.752** [0.352]	0.763* [0.416]	0.709* [0.406]
Inductee into merchant guild/co.	0.167* [0.096]	0.216*** [0.081]	0.153* [0.084]	0.180** [0.068]	0.185*** [0.066]	0.05 [0.108]	0.127 [0.082]	0.138* [0.082]
Heir	0.031 [0.050]	0.029 [0.046]	0.03 [0.044]	0.028 [0.040]	0.031 [0.040]	0.044 [0.061]	0.047 [0.057]	0.046 [0.055]
Inherited land	0.001 [0.054]	0.015 [0.050]	-0.003 [0.050]	0.005 [0.046]	0.008 [0.044]	-0.008 [0.059]	-0.007 [0.052]	-0.003 [0.048]
Inherited 3 or more manors	-0.019 [0.045]	-0.057 [0.051]	-0.017 [0.041]	-0.046 [0.042]	-0.05 [0.042]	-0.045 [0.052]	-0.067 [0.048]	-0.066 [0.047]
Father knight or baronet	0.016 [0.058]	-0.019 [0.065]	0.015 [0.053]	-0.013 [0.056]	-0.033 [0.055]	0.008 [0.052]	-0.009 [0.054]	-0.028 [0.051]
Father noble	0.048 [0.087]	0.011 [0.093]	0.041 [0.077]	0.004 [0.078]	-0.02 [0.084]	0.048 [0.075]	0.03 [0.076]	0.001 [0.079]
Landed prior to Tudor dynasty	-0.055 [0.066]	-0.042 [0.060]	-0.048 [0.059]	-0.04 [0.052]	-0.035 [0.051]	-0.017 [0.068]	-0.007 [0.066]	-0.003 [0.063]
Inherited tie to royal court	-0.142*** [0.055]	-0.147** [0.061]	-0.131** [0.051]	-0.133** [0.054]	-0.124** [0.056]	-0.157*** [0.051]	-0.174*** [0.053]	-0.162*** [0.055]
Puritan education	0.159* [0.087]	0.141* [0.085]	0.146* [0.084]	0.127* [0.075]	0.112 [0.075]	0.123 [0.084]	0.109 [0.080]	0.096 [0.079]
Puritan ministers per 10000 in county		0.110*** [0.036]		0.089*** [0.028]	0.016 [0.044]		0.068* [0.040]	-0.002 [0.056]
Borough constituency		0.065 [0.064]		0.059 [0.055]	0.051 [0.056]		0.114 [0.072]	0.105 [0.069]
Urban pop.> 5000 (1600)		-0.09 [0.129]		-0.059 [0.105]	-0.079 [0.102]		-0.062 [0.095]	-0.079 [0.099]
Log. population density of county (1600)		0.210** [0.093]		0.139*** [0.051]	0.090* [0.052]		0.079 [0.076]	0.033 [0.080]
Port (1603)		-0.045 [0.065]		-0.045 [0.056]	-0.051 [0.056]		-0.115* [0.061]	-0.111* [0.065]
Port trading with Atlantic (1603)		-0.225 [0.191]		-0.187 [0.179]	-0.17 [0.162]		-0.331 [0.294]	-0.292 [0.284]
Region of constituency FE	no	no	no	no	yes	no	no	yes
Observations	531	531	531	531	531	519	519	519
Ln L RMSE	-327.44	-311	0.47	0.46	0.45	0.52	0.51	0.49
(Pseudo) R2	0.1	0.15	0.13	0.18	0.21			
Exogeneity test (F) F-test (excluded instrument)			3.00	2.36	1.94	15.35	10.58	10.71
Prob>F			0.090	0.131	0.169	0.000	0.002	0.002

Robust standard errors clustered at county of representation level: * significant at 10%; ** 5%; *** 1%; All regressions include controls for father investor in joint stock and age over 30. (2),(4),(5),(7),(8) include controls for constituency in traditional Crown lands or containing Royal or noble castles.

Table 5: Regression: supporter of Parliamentary control, II

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Probit (dF/dX)	Probit (dF/dX)	OLS	OLS	OLS	2SLS	2SLS	2SLS
Shareholder in failed JS company	0.172*** [0.063]	0.162** [0.064]	0.162*** [0.057]	0.145** [0.056]	0.152*** [0.052]	0.662** [0.308]	0.643* [0.353]	0.612* [0.351]
Inductee into merchant guild/co.	0.163* [0.096]	0.210** [0.082]	0.150* [0.084]	0.177** [0.069]	0.181*** [0.066]	0.06 [0.113]	0.124 [0.084]	0.138* [0.082]
Inherited land	0.003 [0.054]	0.017 [0.051]	-0.001 [0.050]	0.008 [0.046]	0.01 [0.045]	-0.003 [0.056]	0.004 [0.051]	0.002 [0.047]
Constituency controls*	no	yes	no	yes	yes	no	yes	yes
Region of constituency FE	no	no	no	no	yes	no	no	yes
Observations	531	531	531	531	531	519	519	519
Ln L RMSE	-328.36	-311.73	0.47	0.46	0.45	0.49	0.48	0.47
(Pseudo) R2	0.1	0.14	0.13	0.18	0.21			
Exogeneity test (F) F-test (excluded instrument)			2.71	2.14	1.75	24.20	18.26	17.25
Prob>F			0.106	0.150	0.191	0.000	0.000	0.000

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	2SLS	2SLS	OLS	OLS	2SLS	2SLS
Shareholder in joint stock	0.214*** [0.047]	0.188*** [0.044]	0.751* [0.433]	0.653 [0.502]				
Shareholder x merchant guild	-0.274* [0.137]	-0.256** [0.113]	0.005 [0.683]	0.285 [0.780]				
Shareholder (failed JS)					0.213*** [0.052]	0.190*** [0.053]	0.664* [0.375]	0.562 [0.422]
Shareholder (failed JS) x merchant					-0.241* [0.138]	-0.224* [0.122]	-0.011 [0.659]	0.292 [0.739]
Inductee into merchant guild/co.	0.245*** [0.071]	0.259*** [0.061]	0.048 [0.230]	0.051 [0.243]	0.230*** [0.071]	0.246*** [0.059]	0.064 [0.238]	0.048 [0.240]
Inherited land	-0.001 [0.048]	0.011 [0.044]	-0.008 [0.060]	-0.005 [0.051]	0.001 [0.048]	0.012 [0.044]	-0.003 [0.057]	-0.001 [0.051]
Constituency controls*	no	yes	no	yes	no	yes	no	yes
Region of constituency FE	no	yes	no	yes	no	yes	no	yes
Observations	531	531	519	519	531	531	519	519
Ln L RMSE	0.47	0.45	0.52	0.49	0.47	0.45	0.49	0.47
R2	0.14	0.22			0.14	0.22		

Robust standard errors clustered at county of representation level: * significant at 10%; ** 5%; *** 1%; All regressions include the following controls: father investor in joint stock, age over 30, merchant guild, heir, inherited land, inherited 3+ manors, father knight or baronet, father noble, landed prior to Tudor dynasty, inherited ties to royal court, Puritan education. *Constituency controls include: Puritan ministers per 10000, borough, urban pop.> 5000, Log. population density, Port, Atlantic port, constituency in traditional Crown lands or containing Royal or noble castles.

Table 6: **Regression: Financial contributor to Parliamentary defense, 1642**

Loan contributor to Defence 1642	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	2SLS	2SLS	OLS	OLS	2SLS	2SLS
Shareholder in joint stock	0.154*** [0.052]	0.135** [0.052]	1.381*** [0.514]	1.421** [0.604]				
Shareholder x merchant guild	-0.048 [0.117]	-0.029 [0.119]	-1.151* [0.645]	-1.317* [0.757]				
Shareholder (failed JS)					0.244*** [0.054]	0.224*** [0.052]	1.243*** [0.463]	1.241** [0.513]
Shareholder (failed JS) x merchant					-0.187* [0.109]	-0.17 [0.119]	-1.059* [0.566]	-1.127* [0.608]
Inductee into merchant guild/co.	0.017 [0.087]	0.017 [0.079]	0.222 [0.215]	0.335 [0.220]	0.04 [0.081]	0.041 [0.073]	0.138 [0.153]	0.206 [0.141]
Inherited land	0.015 [0.042]	0.028 [0.043]	0.023 [0.066]	0.033 [0.065]	0.019 [0.042]	0.031 [0.042]	0.032 [0.059]	0.041 [0.058]
Inherited 3 or more manors	0.069 [0.053]	0.031 [0.055]	0.006 [0.073]	-0.003 [0.072]	0.064 [0.054]	0.028 [0.055]	0.008 [0.066]	-0.003 [0.064]
Heir	-0.082* [0.045]	-0.082* [0.042]	-0.06 [0.084]	-0.05 [0.086]	-0.085* [0.046]	-0.085* [0.043]	-0.081 [0.071]	-0.081 [0.068]
Inherited tie to royal court	-0.128** [0.049]	-0.118** [0.052]	-0.150** [0.073]	-0.161** [0.072]	-0.139*** [0.050]	-0.128** [0.052]	-0.201*** [0.061]	-0.204*** [0.060]
Landed prior to Tudor dynasty	-0.066 [0.044]	-0.059 [0.039]	-0.015 [0.071]	0.006 [0.071]	-0.063 [0.043]	-0.056 [0.039]	-0.024 [0.056]	-0.01 [0.058]
Father knight or baronet	-0.083 [0.054]	-0.114** [0.054]	-0.109* [0.058]	-0.122** [0.057]	-0.087 [0.052]	-0.117** [0.052]	-0.109** [0.053]	-0.126** [0.050]
Father noble	-0.195*** [0.058]	-0.248*** [0.058]	-0.191** [0.091]	-0.203** [0.097]	-0.199*** [0.053]	-0.250*** [0.054]	-0.209*** [0.063]	-0.233*** [0.066]
Puritan education	0.041 [0.061]	0.014 [0.059]	0.001 [0.077]	-0.029 [0.076]	0.037 [0.061]	0.01 [0.059]	0.001 [0.071]	-0.029 [0.069]
Constituency controls*	no	yes	no	yes	no	yes	no	yes
Region of constituency FE	no	yes	no	yes	no	yes	no	yes
Observations	545	545	533	533	545	545	533	533
RMSE	0.46	0.46	0.63	0.63	0.46	0.45	0.55	0.54
R-squared	0.10	0.16			0.11	0.17		

Robust standard errors clustered at county of representation level: * significant at 10%; ** 5%; *** 1%; All regressions include the following controls: father investor in joint stock, age over 30, merchant guild, heir, inherited land, inherited 3+ manors, father knight or baronet, father noble, landed prior to Tudor dynasty, inherited ties to royal court, Puritan education. *Constituency controls include: Puritan ministers per 10000, borough, urban pop.> 5000, Log. population density, Port, Atlantic port, constituency in traditional Crown lands or containing Royal or noble castles.

Table 7: **Regression: Log(contemporaneous income)**

Income estimates (1640s)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	2SLS	2SLS	OLS	OLS	2SLS	2SLS
Shareholder in joint stock	0.329 [0.214]	0.203 [0.177]	0.100 [0.794]	-0.032 [0.888]				
Shareholder x merchant guild	0.478 [0.474]	0.905* [0.495]	1.336 [0.902]	1.368 [1.081]				
Shareholder (failed JS)					0.399* [0.210]	0.266 [0.196]	0.103 [0.794]	-0.018 [0.875]
Shareholder (failed JS) x merchant					0.393 [0.487]	0.732 [0.519]	1.297 [0.865]	1.332 [1.035]
Inductee into merchant guild/co.	0.152 [0.312]	0.375 [0.304]	-0.071 [0.380]	0.208 [0.412]	0.202 [0.286]	0.478 [0.303]	0.020 [0.340]	0.302 [0.397]
Inherited land	0.644** [0.285]	0.779*** [0.268]	0.627** [0.288]	0.793*** [0.279]	0.674** [0.279]	0.794*** [0.261]	0.653** [0.282]	0.799*** [0.254]
Inherited 3 or more manors	0.445*** [0.141]	0.352** [0.152]	0.446*** [0.142]	0.345** [0.148]	0.446*** [0.137]	0.363** [0.148]	0.457*** [0.141]	0.361** [0.140]
Heir	0.271 [0.173]	0.290 [0.184]	0.237 [0.179]	0.306 [0.205]	0.279 [0.173]	0.301 [0.184]	0.250 [0.177]	0.316 [0.202]
Inherited tie to royal court	0.065 [0.133]	-0.003 [0.121]	0.039 [0.124]	0.007 [0.121]	0.054 [0.130]	-0.012 [0.121]	0.036 [0.128]	0.001 [0.132]
Landed prior to Tudor dynasty	0.056 [0.158]	-0.068 [0.149]	0.051 [0.146]	-0.072 [0.129]	0.057 [0.162]	-0.065 [0.149]	0.049 [0.147]	-0.070 [0.129]
Father knight or baronet	0.394*** [0.111]	0.395*** [0.115]	0.412*** [0.103]	0.388*** [0.111]	0.383*** [0.111]	0.383*** [0.113]	0.400*** [0.104]	0.376*** [0.108]
Father noble	0.726** [0.279]	0.841** [0.340]	0.746*** [0.264]	0.808*** [0.302]	0.713** [0.277]	0.823** [0.336]	0.729*** [0.261]	0.788*** [0.301]
Puritan education	0.115 [0.170]	0.132 [0.164]	0.124 [0.217]	0.184 [0.224]	0.139 [0.168]	0.160 [0.164]	0.159 [0.194]	0.215 [0.191]
Constituency controls*	no	yes	no	yes	no	yes	no	yes
Region of constituency FE	no	yes	no	yes	no	yes	no	yes
Observations	270	270	265	265	270	270	265	265
RMSE	1.02	0.93	0.98	0.87	1.02	0.93	0.98	0.87
R-squared	0.27	0.42			0.27	0.42		

Robust standard errors clustered at county of representation level: * significant at 10%; ** 5%; *** 1%; All regressions include the following controls: father investor in joint stock, age over 30, merchant guild, heir, inherited land, inherited 3+ manors, father knight or baronet, father noble, landed prior to Tudor dynasty, inherited ties to royal court, Puritan education. *Constituency controls include: Puritan ministers per 10000, borough, urban pop.> 5000, Log. population density, Port, Atlantic port, constituency in traditional Crown lands or containing Royal or noble castles.

Table 8: Regression: Courtier before Long Parliament

Courtier before 1640	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	2SLS	2SLS	OLS	OLS	2SLS	2SLS
Shareholder in joint stock	0.053 [0.053]	0.06 [0.056]	0.914** [0.359]	1.202** [0.519]				
Shareholder x merchant guild	0.176 [0.105]	0.191* [0.104]	-0.661* [0.354]	-0.951* [0.527]				
Shareholder (failed JS)					0.043 [0.047]	0.05 [0.051]	0.820*** [0.313]	1.045** [0.408]
Shareholder (failed JS) x merchant					0.218* [0.121]	0.250** [0.124]	-0.612* [0.328]	-0.815** [0.405]
Inductee into merchant guild/co.	-0.165*** [0.035]	-0.167*** [0.048]	0.023 [0.092]	0.125 [0.117]	-0.168*** [0.034]	-0.172*** [0.046]	-0.023 [0.070]	0.031 [0.076]
Inherited land	-0.026 [0.047]	-0.027 [0.052]	-0.004 [0.060]	-0.002 [0.069]	-0.026 [0.047]	-0.027 [0.051]	0.002 [0.056]	0.005 [0.064]
Inherited 3 or more manors	-0.007 [0.035]	0.001 [0.036]	-0.048 [0.043]	-0.028 [0.051]	-0.006 [0.035]	0.002 [0.036]	-0.047 [0.040]	-0.027 [0.045]
Heir	-0.059 [0.043]	-0.045 [0.046]	-0.069 [0.065]	-0.04 [0.076]	-0.058 [0.043]	-0.044 [0.046]	-0.082 [0.055]	-0.064 [0.061]
Inherited tie to royal court	0.485*** [0.039]	0.471*** [0.040]	0.479*** [0.044]	0.445*** [0.052]	0.482*** [0.039]	0.467*** [0.041]	0.446*** [0.048]	0.409*** [0.054]
Father knight or baronet	-0.005 [0.037]	0.013 [0.039]	-0.03 [0.056]	-0.001 [0.064]	-0.006 [0.037]	0.012 [0.038]	-0.031 [0.051]	-0.005 [0.056]
Father noble	-0.135** [0.055]	-0.098 [0.059]	-0.144** [0.071]	-0.072 [0.090]	-0.136** [0.055]	-0.099 [0.059]	-0.156** [0.062]	-0.098 [0.072]
Constituency controls*	no	yes	no	yes	no	yes	no	yes
Region of constituency FE	no	yes	no	yes	no	yes	no	yes
Observations	545	545	533	533	545	545	533	533
RMSE	0.38	0.38	0.48	0.54	0.38	0.38	0.44	0.48
R-squared	0.28	0.29			0.28	0.30		

Robust standard errors clustered at county of representation level: * significant at 10%; ** 5%; *** 1%; All regressions include the following controls: father investor in joint stock, age over 30, merchant guild, heir, inherited land, inherited 3+ manors, father knight or baronet, father noble, landed prior to Tudor dynasty, inherited ties to royal court, Puritan education. *Constituency controls include: Puritan ministers per 10000, borough, urban pop.> 5000, Log. population density, Port, Atlantic port, constituency in traditional Crown lands or containing Royal or noble castles.

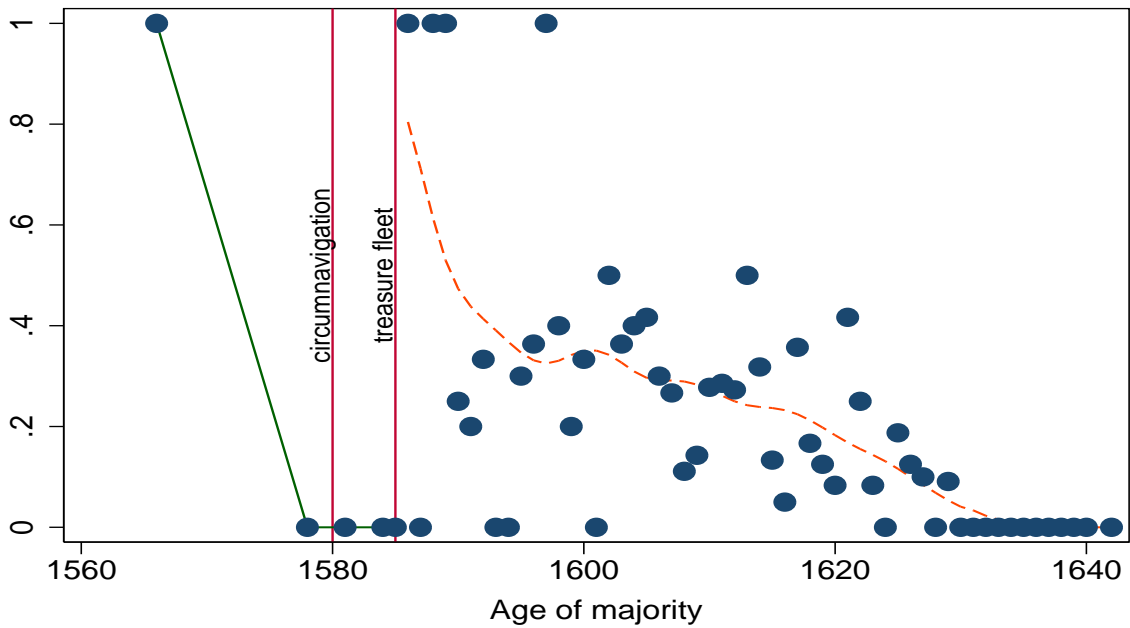


Figure 1: Drake's exploits and proportion shareholders in Long Parliament (local regression fit)

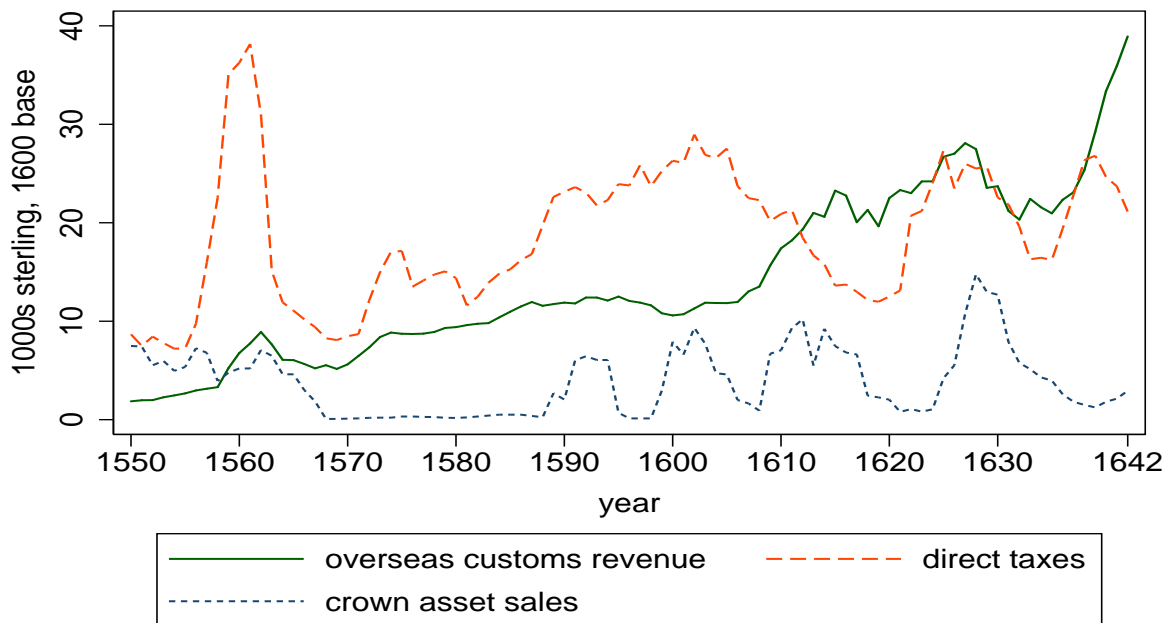


Figure 2: **The rise of overseas customs revenues.** (source: ESFDB/obrien/, (O'Brien and Hunt 1993, O'Brien and Hunt 1999), *moving averages*).

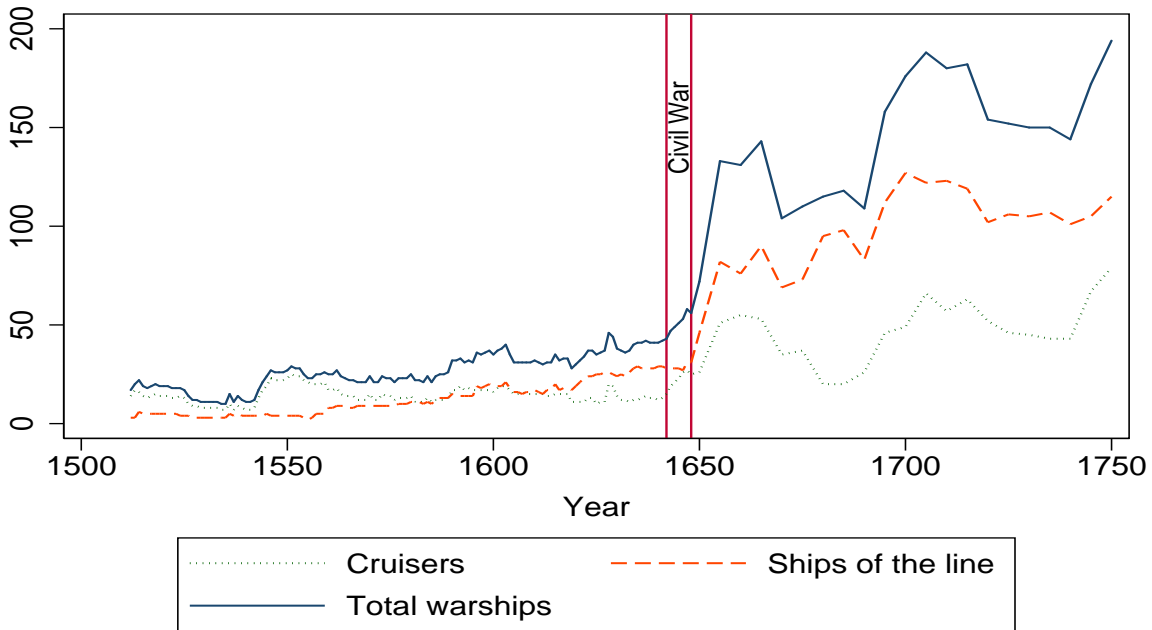


Figure 3: **Warships in the Royal Navy, 1518-1750** source: Rodger (1997,2004). *Cruisers*: ships > 100 tons burthen; *Ships of the line*: > 500 tons & 50+ guns. The naval classification of “ships of the line” was introduced midway through this period, so ships from the preceding period classified using definition above.

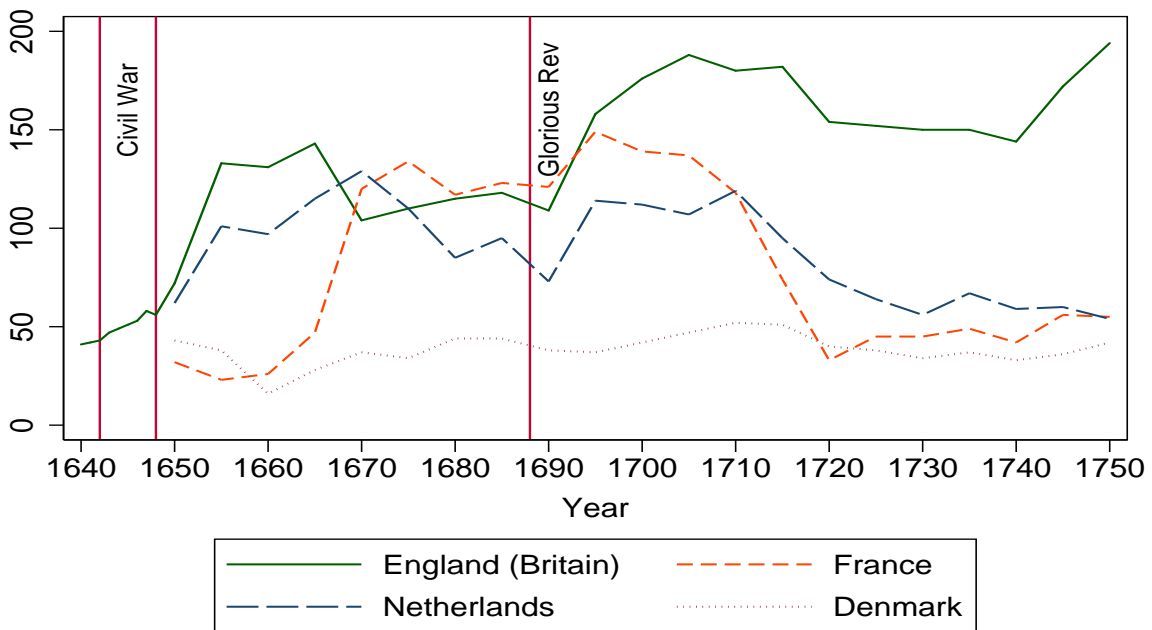


Figure 4: **Warships in the Royal Navy and its rivals, 1640-1750** source: Rodger (1997,2004).