The Politics of Market Access in the Aftermath of Britain's Glorious Revolution

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Abstract

Britain after the Glorious Revolution provides a revealing context to study the role of politics in creating entry barriers to organizations. We present theory and evidence on how lobbying efforts and party politics worked in concert to slow the diffusion of business forms necessary for infrastructure improvement. Our empirical analysis shows that promotion and opposition to river navigation acts depended on majority party strength in nearby constituencies represented in the House of Commons. Although we find evidence for political limits on accessing river navigation companies, the long-run bias was small because of frequent party turnover. More generally we provide a new empirical framework for studying open versus limited access orders.

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I. Introduction

Barriers to entry are pervasive in many settings because they have a powerful economic logic. Incumbent firms and groups lobby for barriers because free entry erodes their economic rents. In short, it pays to buy protection. Arguably there is a further political logic to entry barriers but it depends on a society's institutions. In cross-county analysis Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2002) find that countries with heavier regulation of entry tend to have higher corruption and those with more democratic and limited governments have lighter regulation of entry. In an influential book, North, Wallis, and Weingast (2009) offer a conceptual framework for the political determinants of entry barriers. In what they term, 'limited access orders' elites within the ruling coalition purposely limit entry in order to maintain social order. The idea is that economic rents give powerful elites an incentive to support the ruling coalition. North, Wallis, and Weingast describe an alternative regime—open access—in which elites choose free entry, but only because key institutions make it in their interest to do so.

This paper contributes to the literature by developing theory and micro-evidence on the political forces supporting entry barriers. Much of the evidence is based on cross-country comparisons similar to Djankov et. al. and North, Wallis, and Weingast. There is little micro evidence linking firm entry with connections to a ruling coalition such as a dominant political party. In terms of theory, the model presented here could be used in any adversarial context where there is bias to some group because of their political characteristics. Most of the lobbying models in the spirit of Grossman and Helpman (2001) do not incorporate such bias.

The general context for this paper is familiar to economic historians and economists studying long-term development. In the aftermath of the 1688 Glorious Revolution, Britain's

political institutions fundamentally changed. The monarchy was weakened and Parliament came to play an active role in government. The traditional story is that the Glorious Revolution contributed to Britain's development (e.g. North and Weingast 1989, Acemoglu and Robinson 2012), but it is often noted that rent seeking remained common after (Griffiths, Hunt, and O'Brien 1991; Mokyr and Nye 2007; Zahedieh 2010). Restrictions on creating corporations are one of the most commonly discussed cases of rent-seeking. From 1688 through the mid-nineteenth century there was a legal requirement that corporations be established one at a time through specific acts of Parliament. There is a view in the literature that the 'one at a time' chartering regime helped vested interests block entry, but that politics did not play a direct role. For example, Harris (2000, p. 135) argues that "barriers on entry into the corporate world was not created by Parliament intentionally, nor was it to any considerable degree manipulated by Parliament….Parliament served only as the arena and set the procedural rules. The arena was left open to the active players in this game, the vested interests. And it was the vested interests which created the barriers on entry." An alternative view gives politicians in Parliament greater agency when they acted in unison as a political party. The decades after the Glorious Revolution are notable for intense political competition between the Whigs and Tories. The relative strength of the two parties in the House of Commons is thought to have greatly influenced policy making in areas like public finance, foreign policy, and religious freedom.[2] If there was a political logic for restrictions on corporate access, then presumably the Whigs and Tories would have been crucial players as they were the main actors in Parliament.

[2] For the historical literature on Britain's parties see Holmes (1987), Horrowitz (1977), Harris (1993), Hoppit (2000), Speck (1970). For recent economic analysis of parties see Stasavage (2003, 2007); Pincus (2009); Pincus and Robinson (2011).

This paper studies these issues in a sector that was crucial in creating what trade economists call 'market access.' Road transport was expensive in the early 1700s and often prohibitively so for heavy-low value goods like coal. Britain was fortunate to have many navigable rivers, like the Thames or Severn, but large areas in the interior remained distant from inland water transport (Willan 1964). The problem could be addressed by clearing obstructions and building locks on unnavigable rivers. However, such investments required large upfront costs and clear powers of eminent domain. After 1688 it was increasingly common for acts of Parliament to grant a group of 'undertakers' financial and legal rights to undertake river improvements. Most undertakers acted as companies and in practice they were similar to other corporations in having transferable ownership rights. The most important similarity between river navigation companies and corporations was the political process by which they were created. River projects were promoted by mayors, city councils, and local business interests through parliamentary bills. If the bill was successfully enacted the promoters were often named as the undertakers. The problem from the promoter's perspective was the stiff opposition from powerful vested interests. Neighboring cities and landowners petitioned for the rejection of river navigation bills on the grounds they diverted trade or damaged property. Many opposition groups succeeded in stopping or at the very least slowing navigation improvement.

We argue that lobbying efforts and party politics worked in concert to influence the diffusion of river navigation companies. Our theoretical framework analyzes a promoter's decision to introduce a bill for river navigation and an opposition group's decision to fight the bill. Building on theories of persuasion (e.g. Skeperdas and Vaidya 2012) the probability of a river bill succeeding depends on the efforts of promoters and opposition groups as well as Parliament's bias. Our main channel of bias is the 'core-supporter' effect familiar in models of

redistributive politics (Cox and Mcubbins 1986; Dixit and Londregan 1996). We hypothesize that the majority party in the House of Commons targeted approvals or rejections to constituencies depending on the latter's preferences for the project and whether they were more strongly represented. Constituencies were geographic units with seats in the Commons and are similar to US congressional districts.

In the empirical analysis we estimate a reduced form equation for the probability that a constituency has a river act within its jurisdiction in each parliament. We are mainly interested in the effect of having greater majority party strength in and near a constituency conditional on its economic characteristics. The analysis uses new data classifying the party affiliation of all Members of Parliament (MPs) between 1690 and 1741 (Bogart and Oandasen 2013). With this data measures of majority party strength are constructed in and near a constituency. From other sources we also know which constituencies had river improvement acts in each parliament, and who promoted, supported, and opposed river bills through petitions.

The main results show that constituencies with more majority party MPs had a greater probability of having a river act, but if there were more majority party MPs within 25 miles of a constituency then the probability was significantly lower. Consistent with this finding we show that in constituencies with a river bill opposition to that bill was more likely in other constituencies within 25 miles and that opposition was more likely in constituencies where the majority party was strong. The results are consistent with the majority party employing a core constituency strategy where it targeted approvals and rejections based on political characteristics.

In establishing our main results, we address endogeneity problems common in any micro-study. The most pressing concern is that constituencies elected majority party MPs to influence

river acts rather than river acts being influenced by the local strength of majority parties. We explore the robustness of our results using a variety of techniques including random effects, fixed effects, and instrumental variables (IV). The instrument draws on the fact that many constituencies had a local change in majority party strength because of national changes in the majority party which were beyond the control of local voters. The coefficient estimates are shown to be similar across the models and have the greatest significance in the IV estimation.

Our findings show that party politics affected barriers to entry in Britain after the Glorious Revolution. Thus Britain had not yet transitioned to what North, Wallis, and Weingast term open access. However, our evidence also shows that much was accomplished in river navigation in this period. How then did Britain overcome constraints on access? Our data and results suggest that the high degree of party turnover was significant. Constituencies rarely remained under majority party control for long and therefore few experienced prolonged barriers to entry. To illustrate this we examine a counter-factual where every constituency had the same majority party strength in all parliaments. The number of acts and distribution across constituencies is found to be similar to the observed data.

The rest of the paper is organized as follows. The second section provides background and the third lays out a theoretical framework. Section four discusses the data and five outlines the estimation strategy. The empirical results follow along with conclusions.

II. Background on the Politics of Development in Britain

The Glorious Revolution of 1688 marked a significant turning point in the political history of Britain. Over the next two decades the House of Commons and Lords solidified a key role for Parliament in governing the country. The House of Commons, in particular, developed the fiscal

and implicit constitutional power to check the authority of the Monarchy. Britain was fairly unique in this aspect because in other parts of Europe representative institutions had become dormant (Bosker, Buringh, and Luiten van Zanden, 2012).

The transition to representative government was not harmonious and exposed divisions within British society. The most poignant example is the conflict between the Whigs and Tories. Although both were drawn from the elite of British society, the Whigs and Tories differed in several ways. First, the Tories favored privileges for the Church of England, lower taxes, and a small government debt. The Whigs generally favored religious toleration and an aggressive foreign policy based on a well-funded army. Second, the two parties differed in terms of their economic base. The Tories were generally supported by small to medium landowners known as country gentleman. The Whigs drew more support from merchants and large landowners. Third, leadership of the two parties differed. A small group of party mangers known as the 'Junto' led the Whigs before 1720. They were particularly effective in mobilizing Whig MPs on key votes in the Commons. Robert Harley is the best known leader of the Tories, but it is thought to have been less successful in uniting the diverse Tory party (Holmes 1967). After 1721 the Whigs were the dominant party for several decades partly due to the skillful leadership of Robert Walpole.

From 1690 to 1721, the Whigs and Tories competed vigorously for seats in what historians have described as the 'Rage of Party.' There were 11 'parliaments' and the majority party in the Commons changed 7 times (see table 1). The available estimates on the size of majority parties suggest they could be quite large as in the 1710-1713 Parliament with more than 60 percent of MPs being linked to the Tories. They could also be relatively small as in 1705 to 1708 when the Tories held a narrow majority close to 50 percent.

Table 1: Parliament and the Majority Party 1690-1741

Parliament	Majority Party	Estimated % of MPs with Majority Party	Percentage of constituencies where last election was contested
1690-1695	Tory	47.5	46
1695-1698	Whig	50.1	35
1698-1700	Whig	48	43
Jan. 1701	Tory	48.5	35
Nov. 1701	Whig	48.4	34
1702-1705	Tory	58.1	36
1705-1708	Tory	50.7	44
1708-1710	Whig	52.2	38
1710-1713	Tory	64.4	50
1713-1715	Tory	69	36
1715-1722	Whig	61.1	47
1722-1727	Whig	68	54
1727-1734	Whig	76.4	47
1734-1741	Whig	68.6	48

Sources: Majority Party and contested elections are from Cruickshanks, Handley, and Hayton (2002) and Sedgwick's (1970).
Notes: Percentage of constituencies with contested elections applies to England and Wales only.

The high number of contested elections is another important feature of this period. A contested election is defined as an election where there was a poll. It was typical for a constituency represented in the Commons to have two MPs and in these cases a contested election had at least three and normally four candidates, often from opposing parties. The data from Cruickshanks, Handley, and Hayton (2002) and Sedgwick (1970) show that in the average parliament 40 percent of the constituencies had their last election or by-election contested.

There is a literature arguing the party politics affected religious, constitutional, and foreign policy in the decades following 1688. For example, Stasavage (2003, 2007) shows that government bond yields were generally higher in years when the Tories had a majority in the

Commons. Stasavage argues that government bondholders were a key part of the Whig coalition. Some historians have taken a different perspective arguing that the Whigs and Tories did not have the sophisticated organizational structures of modern parties and therefore their ability to coordinate and implement policies was less developed. Geoffrey Holmes, a leading historian of politics from 1702 to 1714 compared the Whigs and Tories with modern parties. He states that "neither possessed a party machine in any strict sense, nor the regular income needed to maintain one; neither employed a system of official whips whose authority was generally recognized. Yet party organization of a kind was undoubtedly achieved in the years from 1702 to 1714, more susceptible to failure, inevitably, than its formalized modern equivalent, but also capable at times of surprising effectiveness (1987 p. 287)." Holmes' last statement opens the possibility that Britain's early parties were able to implement some of the sophisticated targeting strategies employed by modern parties to mobilize supporters and sway voters. Holmes is especially impressed by the Whigs for being a more unified and coherent party than the Tories (p. 245).

There is a related literature on the role of interest groups and policies. For example, it is well documented that the East India Company and the Bank of England influenced trade and banking policies with the aid of the Whigs who were closely linked with these two companies. The Tories had connections with other companies, like the South Sea Company, and also helped to tilt policies in their favor (Carruthers 1999, Harris 2000). Beyond these examples it is less clear to what extent interest groups employed different strategies depending on the whether the Whigs and Tories were in power or whether they had connections with their local MPs.

One of the most important changes in economic policy after 1690 was the growth of legislation changing property rights to land and infrastructure (Bogart and Richardson 2011). Historians who have studies these acts have hinted at links between interest groups and partisan

struggles in the Commons, but have yet to provide conclusive evidence.[3] Our general claim is that much can be learned about the role of politics by studying river navigation acts—a key example of legislation authorizing infrastructure after 1688. River navigation acts are notable because they enabled the first significant improvement in Britain's transport infrastructure since the Middle Ages. In the early 1600s, most rivers were under the authority of local governing bodies known as Sewer Commissions. Sewer Commissions could compel landowners to cleanse waterways and could tax land along riverbanks to pay for upkeep, but not tax individuals who traveled on the river and could not purchase land along a waterway or divert its course. These limitations kept commissions from improving and extending navigable waterways (Willan 1964). A river navigation act addressed these problems by establishing a new special purpose organization. It endowed a company of 'undertakers' with rights to levy tolls and purchase land necessary for the project. The tolls were subject to a price cap and there were provisions on how the project was to be carried out. There were also provisions that allowed juries to determine the price of land if companies and property owners could not come to an agreement.

River navigation acts played a key role in the extension of inland waterways. With the aid of their statutory powers, navigation companies built locks and dredged rivers resulting in significantly lower transport costs. Freight rates on navigable rivers were approximately one-third the freight rates by road in the early eighteenth century (Bogart 2012). For this reason, the expansion of navigable waterways from 850 miles in 1660 to 1600 miles in 1750 was an important factor in Britain's early economic development. Figure 1 draws on Willan (1964) to illustrate the extension of river navigation from 1690 to 1715. The black lines show rivers that were navigable in 1690 and the grey lines depict rivers with acts enabling improvements in their

[3] See Handley (1990), Hoppit (1996, 1997), and Knights (2011) for discussions of the politics of legislation.

navigation. Acts were applied to rivers near the coast or as extensions of existing navigable rivers. Many were connected to cities of importance in the early eighteenth century.

Figure 1: Acts and Navigable Rivers, 1690-1715

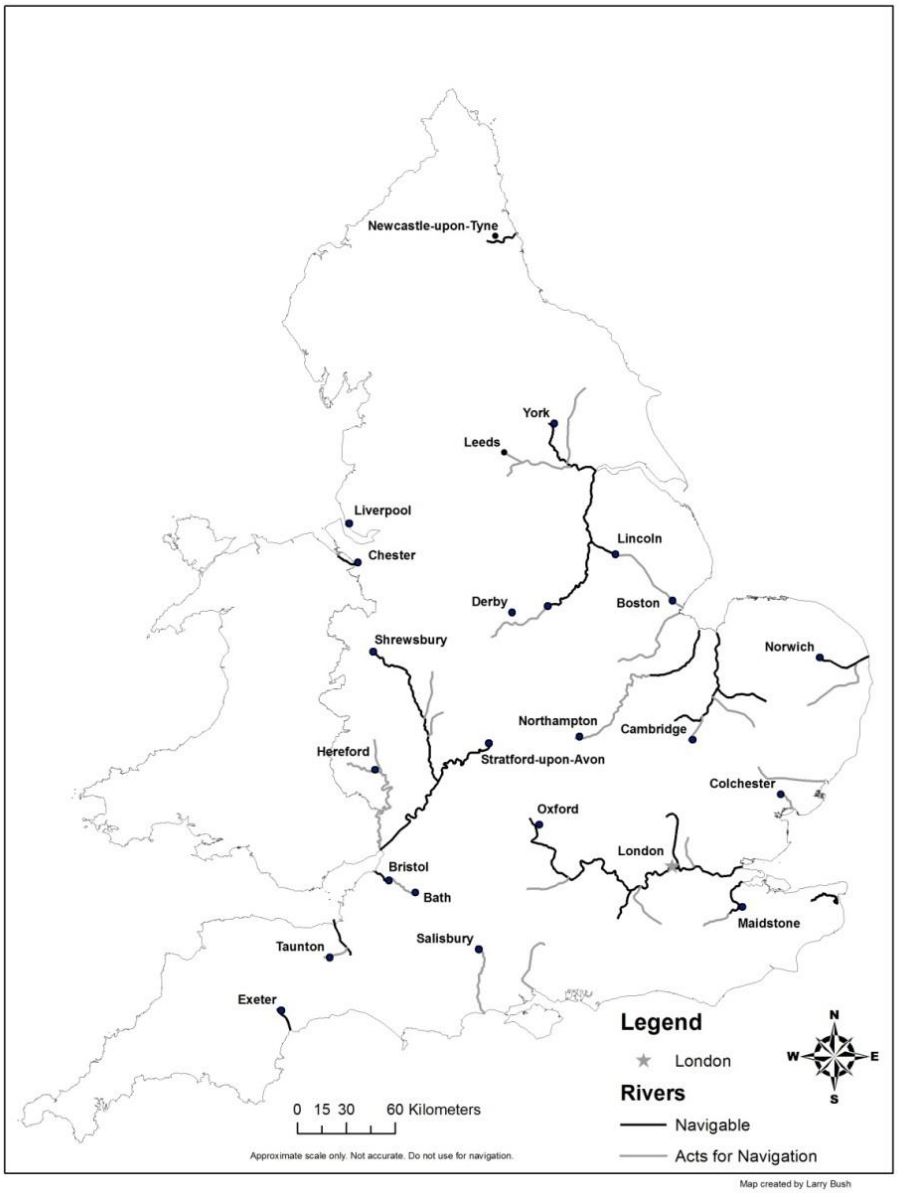
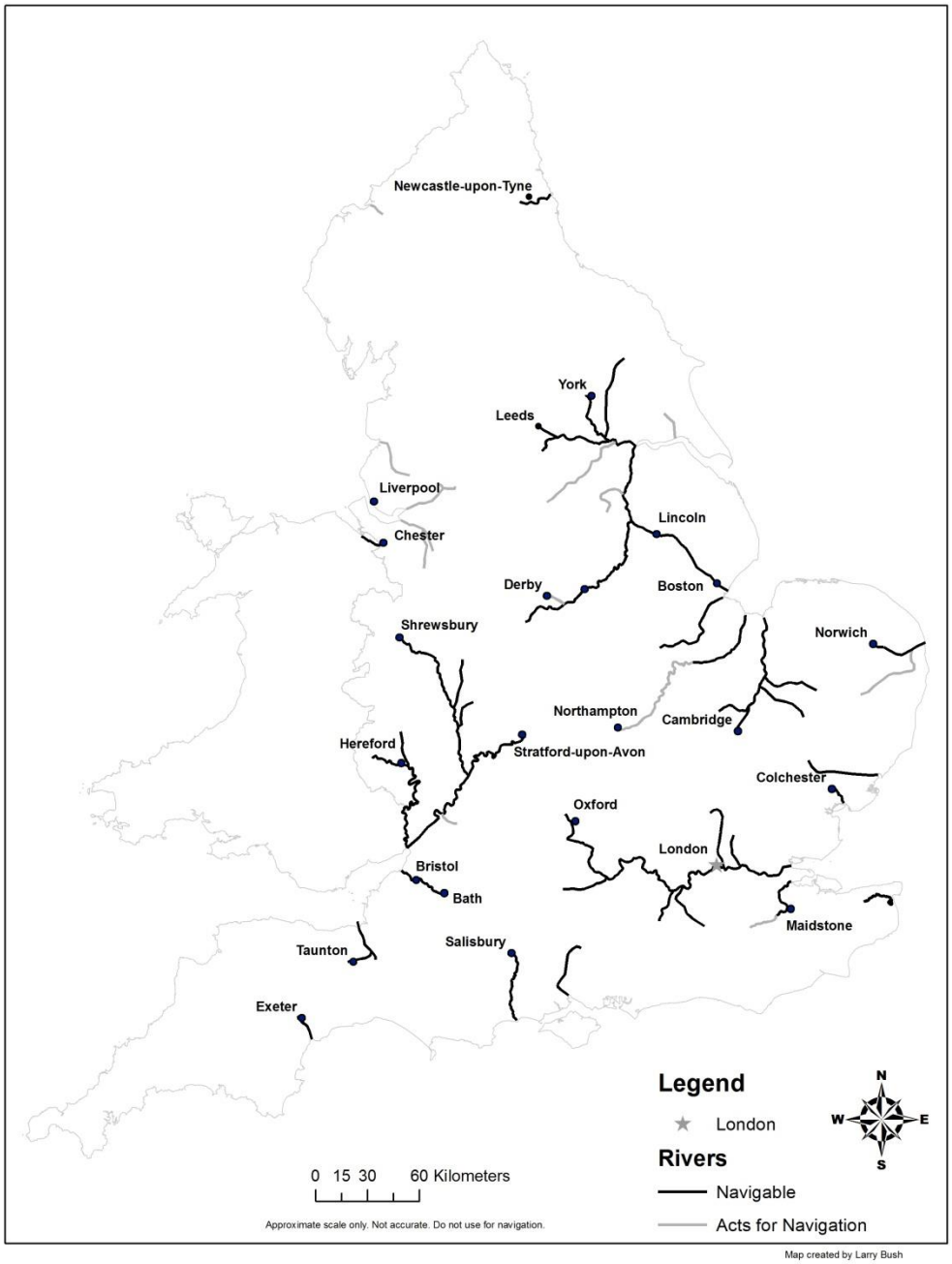


Figure 2 illustrates the extension of river navigation from 1715 to 1741. Now the black lines show rivers that were navigable in 1690 or were made navigable through acts before 1715. In

this second period, river navigation extended to a number of cities in the North including Manchester and Sheffield. Some of these cities would become centers of the Industrial Revolution.

Figure 2: Acts and Navigable Rivers, 1715-1750



River navigation projects had the potential to yield large social gains but they were also controversial. The House of Commons was often the focal point for conflict because individual projects were proposed through a petition to the House of Commons. Petitions became bills that would either fail or succeed in gaining approval, first by the Commons and then by the Lords and Monarchy. Significantly, it was more common for river navigation bills proposing new projects to fail than succeed (see table 2).[4] Success here means that a river bill became an Act. The low success rate partly reflects a handful of projects where bills failed and then were reintroduced in the Commons. Some failed several times before succeeding and some never succeeded at all.

Table 2: River Navigation Bills in the Commons, 1690-1739

	1	2	3
Period	Bills	% Successful	% that were formally Opposed
1690-1699	25	30%	48%
1700-1709	12	25%	42%
1710-1719	16	19%	50%
1720-1729	11	72%	18%
1730-1739	13	38%	46%

Source: see text below

Opposition was a key factor in the low success rate of river navigation bills. In total, 43 percent of river navigation bills between 1690 and 1739 were opposed by groups through petitions to the Commons (see table 2). Opposition groups used a variety of arguments including property damage, employment loss, and trade diversion. The River Avon bill in 1712 provides an example of their arguments.[5] Henry Parsons stated in a petition to the Commons that his six

[4] The sources for these tables will be discussed momentarily. It should also be noted that the failure rates are consistent with what Hoppit (1997) has shown for all legislation from 1690 to 1739.
[5] The details of the petitions related to this bill are available in the Journals of the House of Commons, 1712.

mills on the river Avon would be rendered useless to the great loss of the poor and to himself. He prayed that 'the bill may not pass, or that such damages as the petitioner will sustain thereby may be made good to him by the undertakers.' The Mayor, Burgesses, and Common people of the city of Bristol stated in another petition to the Commons that the bill contained clauses that may be construed to interrupt their ancient Right, and encroach upon the rights lately granted to the petitioners. Bristol had been given authority to make the Avon navigable closer to the sea by an earlier act of Parliament. The gentlemen and freeholders of the county of Somerset, living near the River Avon, stated the project will 'be a great prejudice to all parts of the country near the Bath, by bringing of corn, and other commodities, from Wales, and other parts, where the value of lands are low.' They were also concerned about the 'damages and trespasses they may sustain by making the said River navigable.' Similar arguments were made by the gentlemen and other inhabitants in the neighboring counties of Wiltshire and Gloucester.

The arguments of opposition groups were countered by promoters and other supporters of projects who also petitioned to the Commons. Promoters would usually articulate the reasons why extending river navigation would benefit the local area and the nation. For example, in the case of the river Avon the Mayor, Aldermen, and citizens of the city of Bath argued that making the Avon navigable will employ the poor, promote the trade of Bath, train persons for sea-service, and preserve the roads and highways. After the Avon bill had been vigorously opposed by the groups discussed above the freeholders, leaseholders, and occupiers of quarries near Bath submitted a petition in favor of the bill arguing that it will 'be a means to carry great quantities of wrought and unwrought stone from the quarries near the said River into diverse parts of this kingdom.'

There are numerous other river navigation bills where promoters and their supporters argued against opposition groups. Of equal importance there were several river bills that generated little conflict in the Commons with only a single promoter advancing arguments in favor and no opposition groups challenging its social utility. Therefore the level of opposition and support needs to be explained. Our hypothesis is that party strength near a constituency influenced the degree of opposition to bills and therefore influenced the promotion and approval of river bills. To understand the role of politics more deeply we now propose a theoretical framework.

III. Theoretical framework

We consider a setting where river navigation bills are promoted, opposed, and either approved or rejected. The timing is as follows: a promoter decides whether to introduce a bill, an opposition group decides whether to formally oppose the bill if introduced, the promoter and opposition expend effort trying to persuade the Commons, who then approves or rejects the bill. Every constituency has a single project with an exogenously given expected financial return to the promoter *b* and a loss to an opposition group *l* which we can think of as property damage or lost income from trade diversion effects.

To study how politics and lobbying affected access to river navigation acts, we use a model of persuasion developed by Skeperdas and Vaidya (2012). They motivate their model with a court setting where plaintiffs and defendants produce evidence to influence a judge. There is a parallel to our setting where promoters and opposition groups made arguments to the Commons trying to influence their decision on bills. Applying Skeperdas and Vaidya's model gives a function for the probability that the Commons approves a bill, $= \frac{\pi e_p}{(1-\pi)e_o+\pi e_p}$, where $\pi \in [0,1]$ corresponds to the bias of the Commons in favor of the promoter and e_p and e_o are the efforts of

the promoter and opposition in producing evidence.[6] If π is close to zero then the promoter has almost no chance of getting their bill approved. On the other hand if the effort of the promoter e_p is very high then their chances are better. Below we make the efforts endogenous.

Our main hypothesis is that the bias parameter π will vary with the political characteristics of promoters and opposition groups. The main characteristic in our analysis is majority party representation. We assume that parties want to reward groups in constituencies supporting them in recent elections. There are two important sub-cases. If party supporters in the constituency favor the project then the majority party will increase π if that constituency has more majority party MPs. By contrast, if party supporters in the constituency dislike the project, say because they suffer property damage, then the majority party will decrease π if that constituency has more majority party MPs. We call this the 'core-constituency effect' after models of redistributive politics along the lines of Cox and Mcubbins (1986).

There are other political characteristics of potential importance like whether the constituency had a close election (i.e. a swing constituency effect in the spirit of Dixit and Londregan 1996). The identity of the majority party, either Whig or Tory, could also impart a bias. Below we test for these effects but they turn out to be less important so we give them less emphasis.

It is worth noting here how the bias is connected to open and limited access orders. If promoters operate in a world of open access then π would be constant for all and thus the efforts of all promoters and opposition groups would be treated equally. On the other hand, if politics works to limit access then π will be a function of political characteristics, possibly through the

[6] One could add an additional term in the probability success function to measure project quality. For example, one could add a multiplicative term on promoter effort φ which is a non-decreasing and differentiable function of s, the ratio of promoter benefits to opposing losses, where the slope $\varphi'(s)$ defines parliament's increased preference for projects that have higher social benefits to costs. We do not emphasize this here.

core constituency effect described above. If we fail to reject a core constituency effect then access cannot be deemed open.

Returning to the model, promoter and opposition efforts e_p and e_o influence the probability success function by making bills more or less likely respectively. We treat these decisions as endogenous and model them directly using the tools of contests.[7] The objective function for the promoter is $pb - ce_p$. The first term is the probability the bill is approved $p = \frac{\pi e_p}{(1-\pi)e_o + \pi e_p}$ multiplied by the financial return b. The promoter earns b only if the bill is approved and otherwise their payoff is normalized to 0. The second term is the total cost of effort for the promoter, where c is the marginal cost and e_p is the effort level. The objective function for the opposition is $-pl - ce_o$. The bill succeeds with probability p in which case the opposition gets $-l$. The bill fails with probability $1 - p$ and they get 0. The marginal cost of effort for the opposition is assumed to be the same as the promoter.[8]

The effort decisions are made strategically and the Nash equilibrium is derived from best response functions. The equilibrium efforts e_p^* and e_o^* satisfy the following relationship: $e_o^* = \frac{l}{b} e_p^* = \frac{\pi(1-\pi)l^2}{bc[(1-\pi)l/b + \pi]^2}$. Notice that the ratio of the equilibrium efforts $\frac{e_o^*}{e_p^*}$ is equal to the ratio of losses to benefits $\frac{l}{b}$. After simplification, one can show that the equilibrium success function has the form $p^* = \frac{\pi}{(1-\pi)\frac{l}{b} + \pi}$ and that p^* increases in π and b and decreases in l.[9]

[7] We refer the reader to Konrad (2009) for a good overview of contests.
[8] We could also model differences in the costs of effort between promoters and opposition groups. One approach assumes the costs differ according to majority party MPs near the promoter and opposition. This assumption gives qualitatively the same results as changes in π so we do not model it here.
[9] There is a non-monotonic relationship between π and efforts e_p^* and e_o^*. Starting from a point where π is close to one (i.e. where there is large bias in favor of promoters) opposition and promoter efforts increase. At some intermediate point efforts are maximized and then as π approaches zero opposition and promoter efforts start to

III.1 Modeling Bill Promotion

The next step examines the promotion of bills and the decision to oppose to bills. Assuming some bill has been introduced by a promoter, the opposition faces a choice whether or not to approach the Commons and formally oppose. If so they must incur a fixed cost, $F_o + \varepsilon$, where F_o is a constant and ε a random variable. Their expected payoff from formally opposing is $-p^* l - ce_o^* - F_o - \varepsilon$, where p^* and e_o^* are defined above. If the opposition does not oppose the bill it will pass with probability one and their payoff is $-l$. Thus the opposition will formally oppose if $-p^* l - ce_o^* - F_o - \varepsilon > -l$, which simplifies to $l(1-p^*)^2 - F_o - \varepsilon > 0$. If we let f be the c.d.f. for ε then we have an expression for the probability of there being opposition: $f(l(1-p^*)^2 - F_o)$. Note that if π is low, say because an opposition group is well represented by the majority party, then p^* is small and the probability of there being opposition is larger.

The expected payoff to the promoter if they introduce the bill simplifies to the expression bp^{*2}. The promoter must incur a fixed cost $F_p + \varepsilon$ to introduce the bill where F_p is a constant and ε is a random variable. We assume that the promoter anticipates the behavior of opposition groups and their own efforts at a later stage. Thus a rational, forward looking promoter will introduce only if $bp^{*2} > F_p + \varepsilon$. If we let f be the c.d.f. for ε then we have an expression for the probability of a bill being introduced: $f(bp^{*2} - F_p)$. Note that if π is high, say because the promoter is well represented by the majority party, then p^* is large and the probability of a bill occurring is larger.

III.2 Summary

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decrease. The reason is that lobbying efforts payoff the most when the Commons does not have a strong bias in favor or against promoters.

Our model produces an expression for the probability of a bill's success $p^*$and the probability of a bill being introduced: $f(bp^{*2} - F_p)$. Combining these two terms gives the probability of an act: $p^* \times f(bp^{*2} - F_p)$. To get predictions for our core constituency effect we need to know the geographic distribution of supporters and opponents. If we assume for the moment that supporters are more common in the constituency where there is a candidate project then more majority party MPs in that constituency should increase the likelihood of having an act. Also if we assume opponents are common in the vicinity of a constituency, say within 25 miles, then more majority party MPs within 25 miles should decrease its likelihood of having an act. We explore these predictions below.

IV. Data and Sources

The British historical context provides surprisingly rich data to test theories on the politics of entry barriers. The daily records for the House of Commons have survived and are printed in the *Journals of the House of Commons*. The *Journals* identify all bills introduced in the Commons including the period under study here. The details of every river bill were entered in a spreadsheet, including petitions, orders, committee reports, votes, amendments, and whether it became an act.[10] The petitions are particularly useful because they identify the aims of the bill, the groups supporting the bill, and those opposed. Our analysis concerns the fate of new navigation authorities and so bills for amendments are excluded. The resulting sample consists of 69 river navigation bills and among these 33 became river navigation acts. Note that some bills are for projects that were already introduced in an earlier parliament but had failed.

[10] Votes are only occasionally reported. In those cases, the names of the 'tellers' for yes and no and the totals for each side are reported.

The constituency is the spatial unit of analysis in our study. In the British historical context each constituency is one of two types: a county or a municipal borough. There were over 200 boroughs and 45 counties. Counties covered an area around 1000 square miles. Boroughs could be large cities like London and Bristol, but most were medium sized towns with 1000 to 2000 people. Interestingly, there are a number of economically important cities like Manchester that were not boroughs and are represented in the Commons by their county.

In order to study the link with politics we match river navigation bills and acts with political constituencies in England and Wales (Scotland is dropped because it entered the Union in 1707 and it had no river acts before 1741). Matching is fairly straightforward because most references to bills in the *Journals* are very specific in describing the city or county near a project. For example, the River Avon bill discussed earlier clearly identifies the city of Bath, a borough constituency. In a few cases the cities named in the bill are not boroughs as in the case of Manchester. In these cases bills are assigned to county constituencies that govern those cities. For clarity in the coming analysis, we refer to the constituency where a river bill was introduced as the 'matched constituency.'

While there is much research on MPs and political parties, there is no available data quickly summarizing the party affiliation of every MP.[11] As a result we had to construct such information from primary and secondary sources. We identify whether each MP was a Whig when the Whigs were the majority party in the Commons and whether each MP was a Tory when the Tories were the majority party. Thus a dummy variable identifies whether each MP is affiliated with the majority party or not in every legislative session. The political classification draws on division

[11] Cruickshanks, Handley, and Hayton (2002) and Sedgwick (1970) give biographies of every MP and some describe party affiliation but the data is not given in tabular form.

lists which identify party affiliation directly or voting on major pieces of legislation associated with the leaders of the two parties. It should be noted that our measure of party affiliation is conservative in that we identify MPs as being with the majority party only if they consistently voted with the majority party in any parliament. The data and procedures are described in more detail in a separate paper (Bogart and Oandasan 2012).

The party affiliation of each MP is used to measure the number of majority party MPs in each constituency and for every parliament. To illustrate the data, figure 3 maps party classifications for 1708 when the Whigs were the majority party and figure 4 does the same for 1710 when the Tories were the majority party. Boroughs are indicated with symbols. Counties are outlined with white, light grey, or dark grey backgrounds. The darkest boroughs or counties are constituencies where most MPs were with the majority party.[12] The main point is to show that majority party representation varied across space and time. Later we exploit the fact that majority party strength in a constituency often changed because the majority party in the Commons changed. For example, much of the midland constituencies went from low to high majority party representation when the majority party in the Commons switched from the Tories to the Whigs between 1708 and 1710.

Our analysis also draws on Cruickshanks, Handley, and Hayton (2002) and Sedgwick's (1970) list of constituencies that had a contested election in each parliament. From the same sources we also know the number of voters in each county or borough. The general rule was that

[12] Our classifications are based on the fraction of MPs with the majority party in a parliament. In most cases there are two MPs for a constituency so the possible values for the fraction with the majority party are 0, 0.5, and 1. If an MP left the House within a session we have more than two MPs, in which case the fraction with the majority party ranges between 0 and 1 and is based on the length of each MPs tenure. A constituency is considering to be well represented by the ruling party if the fraction of MPs in the ruling party is above 0.8. A constituency is not well represented by the ruling party if the fraction of MPs in the ruling party is below 0.2. The consistency has mixed representation if the fraction of MPs in the ruling party is in-between 0.2 and 0.8.

all freeholders in a county with more than 40 shillings a year in income could vote. In boroughs there was no general rule, but typically there were more voters in large cities. The borough of London for example had the most voters of any borough.

Figure 3: Geography of Majority Party Representation in 1708

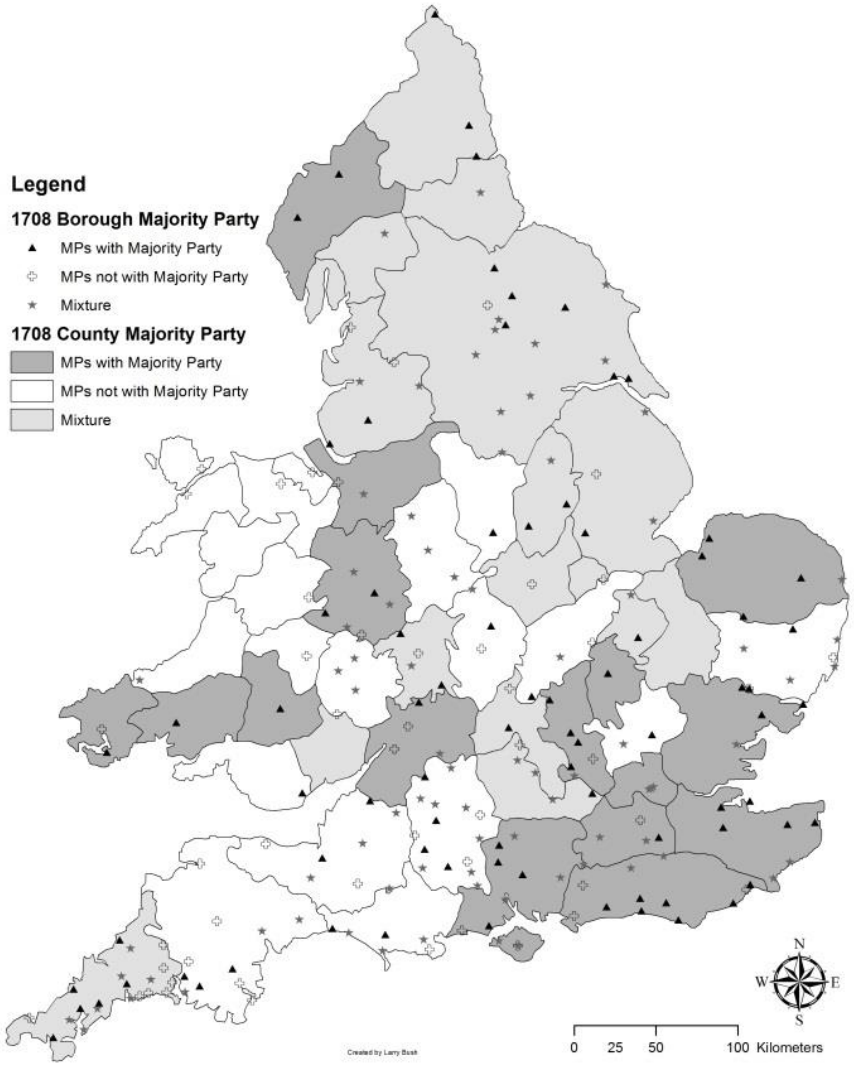
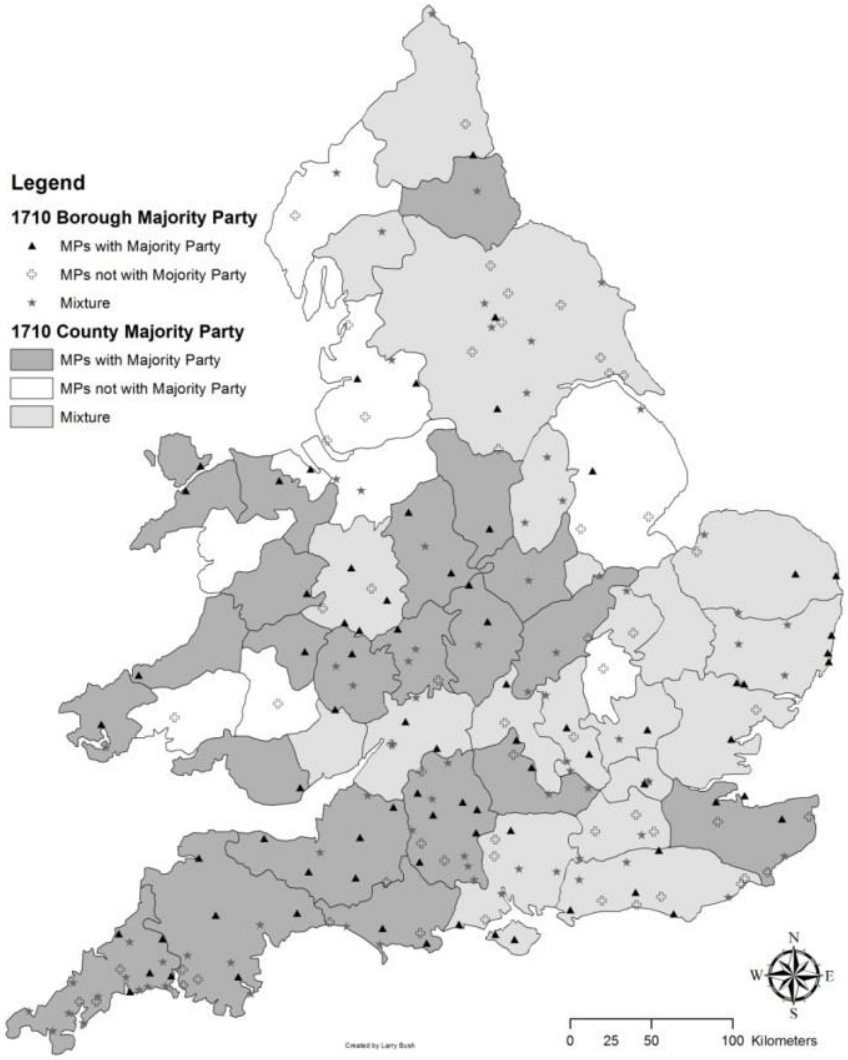


Figure 4: Geography of Majority Party Representation in 1710



Demand for river improvements is likely to be important in explaining their diffusion. As a proxy for demand, we calculate the market potential for each constituency using the inverse distance weighted sum of the population for the 67 largest cities in England. Our list of top cities and their population in 1700 comes from Corfield (1982). To calculate the distance to major cites we link all borough constituencies to a point in space using available latitude and longitude

coordinates for every town in England and Wales. For counties we use the most geographically central town for the latitude and longitude measurement. As an illustration take a three city example where Chester, Liverpool, and Shrewsbury have populations of 10,000, 15,000, and 5,000 respectively. If the distance between Chester and Liverpool is 5 miles and the distance between Chester and Shrewsbury 15 miles then Chester's market potential is the following: 15,000*(1/5) + 5,000*(1/15). Thus market potential essentially measures the population of nearby cities. It provides a good proxy for the navigation's benefits to the promoter because it captures the number of potential users. The number of borough voters or voters per square mile in counties is used as another proxy for demand and hence gains to promoters.

We also develop a proxy for the costs of extending river navigation. A reasonable proxy is the distance to the existing network of navigable waterways c.1690, which should be associated with greater river dredging and the like. We use GIS tools and a digital map of navigable waterways to calculate the distance for each constituency.

Summary statistics for the main variables relating to river acts are shown in the top table 3. Within any individual parliament the probability of a constituency getting an act, provided it has not had one before, is 0.9 percent. The likelihood of a constituency ever having a river act in its jurisdiction between 1690 and 1741 is higher at 12 percent. Two variables that will become important later are dummies for whether some group in a constituency opposed or supported a bill provided they were within 50 miles of a matched constituency. The data show 6.5 percent of these constituencies reported opposition and 10.4 percent reported support.

The main political variables are calculated across all constituency-parliament cells in the middle of table 3. By construction, the number of majority party MPs in a constituency is smaller

than the number of MPs. Within any given parliament, the likelihood of an MP being from the ruling party is just under 50 percent. The other main political variables are dummies for contested elections and years when the Whigs were in the majority. The control variables are shown at the bottom of table 3. Most exhibit substantial variation especially market potential.

Table 3: Summary Statistics

Variable	obs.	Mean	st. dev.	Min	max
Variables for river bills, acts, opposition, and support					
Dummy for Constituencies with a River Act and none previously	3536	0.0087	0.093	0	1
Dummy for constituencies opposing bills if bill is within 50 miles	1347	0.065	0.247	0	1
Dummy for constituencies supporting bills if bill is within 50 miles	1347	0.104	0.306	0	1
Political variables by constituency and parliamentary session					
Number of MPs in constituency with Majority Party	3752	0.943	0.773	0	4
Number of MPs in a constituency	3752	1.9	0.359	0	4
Dummy for contested election in constituency	3752	0.42	0.494	0	1
Dummy for parliaments when Whigs are in Power	3752	0.571	0.494	0	1
Control variables					
Year when parliament ended	3752	1712.2	13.57	1695	1741
Dummy for County constituency	3752	0.194	0.395	0	1
Number of voters for municipality	3024	373.78	765.9	10	7237
Number of voters per sq. mi. for county	728	2.76	1.8	0.195	10.67
Market Potential	3752	8376	33503	1847	551842
Distance to original navigable waterway network	3752	25.42	19.74	0	92.96

Sources: see text.

V. Empirical Strategy

Our first goal is to rigorously establish the relationship between the probability of having a river act in a constituency and majority party strength in and near a constituency. We use a binary choice model where the variable $y_{it} = 1$ if constituency *i* has a river act in its jurisdiction in parliament *t* and has not had a river act in any previous parliament. If constituency *i* had a river act in any previous parliament then it is dropped. Otherwise, $y_{it} = 0$. Note we treat acts as a one-time event for each constituency. Most constituencies had one river project suitable for navigation and only two constituencies, the massive counties of Yorkshire and Lancashire, had more than one river navigation act in our time period. As these counties were not the norm, dropping constituencies after they get a navigation act is likely to be the best approach.

Our theoretical model suggests that the probability a constituency gets a bill depends on the economic and political characteristics of the constituency closest to the promoter. As most promoters in our sample of river bills reported they resided in or very near the matched constituency, we include each constituency's characteristics, like its market potential, its number of MPs, its number of majority party MPs, and so on. Note that majority party MPs captures the effect of increasing their number while holding the overall number of MPs constant. Increasing the overall number captures the effect of having more MPs absent any party consideration.

The theoretical model also suggests that the characteristics of constituencies closest to the opposition should matter. We do not know the location of all potential opposition groups, but our sources suggest most were relatively close to the matched constituency. Moreover as we show below most groups that opposed bills were located in constituencies less than 25 miles from the matched constituency. Thus we focus on models that include the sum of constituency variables within a 25 mile radius of each constituency. For example, we include the sum of the market potential for all constituencies within 25 miles of constituency *i*, the number of MPs within 25

miles, the number of majority party MPs within 25 miles, and so on.[13] We follow our approach for other spatial variables by linking all borough and county constituencies to a point in space and then calculate the number of majority party MPs, the number of total MPs, then number of constituencies with contested elections, etc. within 25 miles.

We begin with a logit model, $logit(p_{it}) = \alpha + \beta_1 cons_{it} + \beta_2 cons25_{it} + \beta_3 year_t + \beta_4 whig_t + \mu_i,$ where $logit$ is the logistic function, $p_{it} = Prob(y_{it} = 1)$, $cons_{it}$ are economic and political variables for a constituency *i* in parliament *t*, $cons25_{it}$ is the sum of economic and political variables for all constituencies within 25 miles of constituency *i* in parliament *t* , $year_t$ is similar to a time trend identifying the year when the parliament ended, and $whig_t$ is a dummy variable for years when the Whigs were in the majority. We also include a constituency random effect μ_i to address unobservable factors uncorrelated with our variables of interest. The random effects model makes some strong assumptions so as a robustness check a conditional fixed effects logit model is also estimated along with a linear probability model with fixed effects for each constituency and for each parliament. In the linear model we estimate $y_{it} = \alpha + \mu_i + \delta_t + \beta_1 cons_{it} + \beta_2 cons25_{it} + \varepsilon_{it}$ where μ_i is now a vector of fixed effects for each constituency, δ_t is a vector of fixed effects for each parliament *t*, $cons_{it}$ and $cons25_{it}$ includes constituency time-varying political variables like majority party MPs and contested elections, and ε_{it} is the error term. The advantage here is that we control for any time-invariant unobservable factors correlated with $cons_{it}$ and $cons25_{it}$.[14]

[13] We also ran several models with different distances for all constituencies within 10, 15, 20, 25, 30, or 35 miles. We found that 25 miles gave the highest chi-square statistic for joint significance.

[14] The downside in the linear model is that we cannot include time-invariant characteristics like market potential and we could get predicted probabilities less than 0 and more than 1. The conditional fixed effects logit model avoids the latter problem, but predictions are not possible as the constituency fixed effects are not directly estimated.

There is another concern that interest groups campaign to get majority party MPs elected in order to get a river navigation act near their constituency, or perhaps even to encourage its rejection. To address this problem we employ an instrumental variables (IV) strategy. We exploit the fact that constituencies had little influence over which party was in the majority in the Commons and some were less likely to switch parties because of historical ties to one party or to the MPs in office. Empirically we also find that constituencies that had more majority party MPs in the previous parliament are likely to have fewer in the current session if there was a change in the majority party in the House of Commons. Thus we use as our instrument the number of majority party MPs in a constituency in the previous parliament and its interaction with a variable indicating whether the majority party changed in the Commons. The details of the IV strategy are discussed below.[15]

We close this section noting that our coefficients and their significance is revealing for whether Britain was 'open' access. In the spirit of North, Wallis, and Weingast (2009), we define open access as an environment where the political characteristics of constituencies have no effect on whether they got a river navigation act after conditioning on their economic characteristics. For clarity consider our variables as coming from two groups. The first are political variables which includes number of MPs, majority party MPs, and contested elections in and near a constituency. The second are economic variables like market potential, distance to navigable waterways, etc. Rejecting the null that the coefficient on any political variable equals zero implies that we can reject open access (at least for river navigation). Our analysis goes further by studying the incidence of opposition to river bills. We test our models' prediction that groups

[15] Some readers might wonder why we did not use close elections to get exogenous variation in the majority party. Unfortunately, we have data on vote tallies for only a subset of our constituencies with contested elections so this approach was not possible.

will be more likely to oppose bills if they have stronger representation by the majority party. Again if we reject the null that any political variable does not affect the decision to oppose then we can reject open access.

VI. Results

Table 4 reports the odds ratios and standard errors for all variables in the random effects logit model. An odds ratio above 1 indicates that the variable increases the probability of an act, whereas an odds ratio less than 1 has the opposite effect. There are several results. First, constituencies with more majority party MPs had a greater probability of having a river act, but if there were more majority party MPs within 25 miles then the probability of having a river act was lower. Most constituencies had zero, one, or two majority party MPs, so the coefficient 1.55 implies that increasing from zero to one or from one to two is estimated to increase the odds of a river act by 55 percent. The odds ratio for majority party MPs within 25 miles is also sizeable in magnitude. Rather than a one-unit increase we consider a standard deviation change of 6. The logit coefficient (not reported) implies that a one standard deviation increase in majority party MPs within 25 miles lowered the probability of an act by 70 percent.

The preceding results can be interpreted as a core constituency effect. If the majority party targeted approvals to promoters in constituencies where they had recently won seats it makes sense that more majority party MPs in a constituency increased the probability of acts all else equal because most promoters tended to reside near the constituency. The logic for majority party MPs within 25 miles is more subtle. Suppose for a moment that opposition groups tended to reside in constituencies within 25 miles and their views were more important politically than supporters of the bill. Under these assumptions if the majority party targeted rejections to

opposition groups in constituencies where they had recently won seats then it makes sense that more majority party MPs within 25 miles lowers the probability of an act all else equal.

Table 4: Probability of getting a River Act, Baseline Logit Model

Variables	Odds Ratio	Standard error
Number majority party MPs, constituency	1.55	0.458
Number majority party MPs, within 25 miles	**0.825**	**0.077**
Number of MPs, constituency	**6.084**	**6.263**
Number of MPs, within 25 miles	1.048	0.095
Contested Election, constituency	0.822	0.365
Contested Election, within 25 miles	1.024	0.144
Whig Majority Dummy	**2.74**	**1.287**
County constituency, constituency	0.0173	0.095
County constituency, within 25 miles	1.073	0.754
Voters in Borough, constituency	**1.001**	**0.0007**
Voters in Borough, within 25 miles	0.999	0.0002
Density of County Voters, constituency	1.518	0.646
Density of County Voters, within 25 miles	1.0999	0.189
Market Potential, constituency	1.00001	0.000014
Market Potential, within 25 miles	**0.99998**	**9.91E-06**
Distance to navigable network, constituency	0.977	0.0233

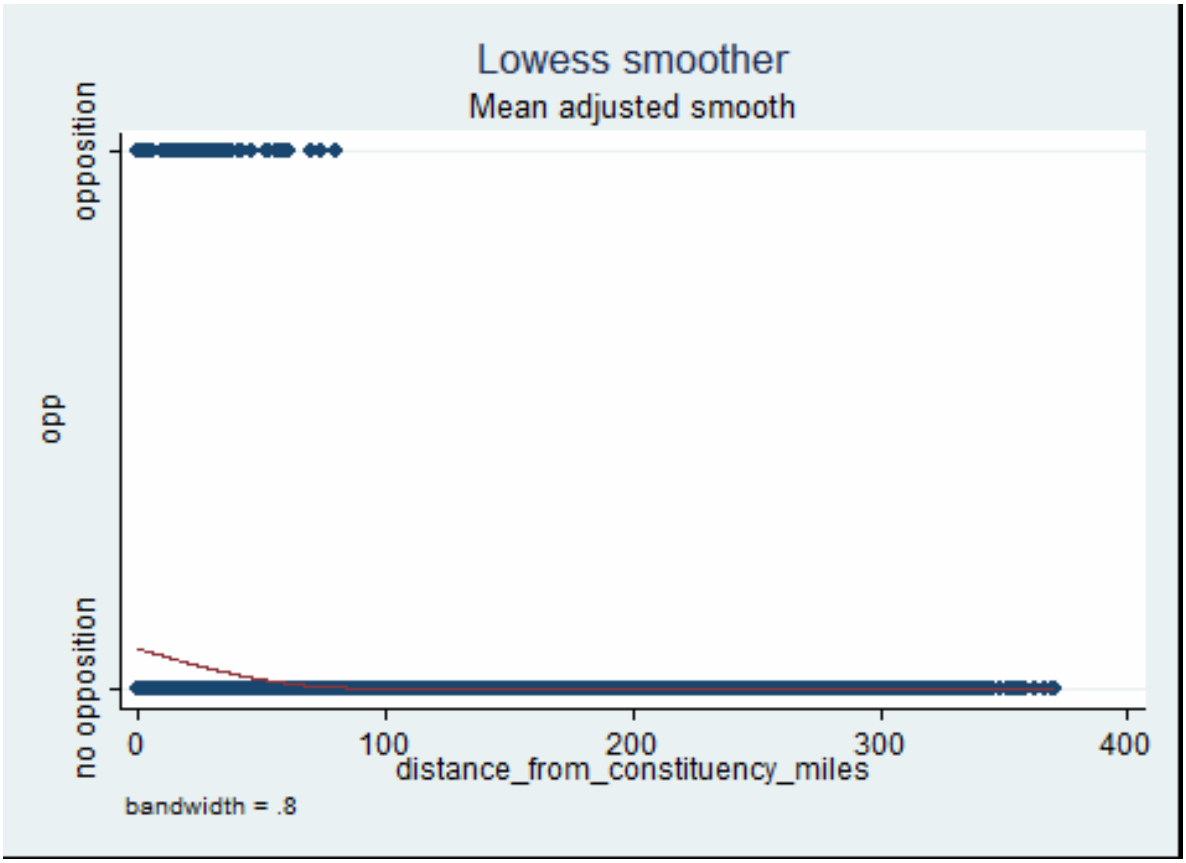
Distance to navigable network, within 25 miles	1.0006	0.0048
Time trend	1.004	0.0215
Constituency Random effects	Yes	
N	3536	
Wald chi2(18)	20.1	
Prob > chi2	0.327	

Notes: Bold indicates statistical significance at the 10% level or below

One crucial assumption in the proceeding argument is that most opposition groups were within 25 miles of a constituency. To test this assumption we estimate a locally weighted regression linking the probability some group in a constituency opposed a bill as a function of its distance to a matched constituency. Observations are organized as constituency-bill cells and so the distance from every constituency to the matched constituency is calculated for each bill. Figure 5 plots the smoothed estimates along with the raw data on opposition and non-opposition distances. The mean distance for opposition groups is 22.7 miles from the matched constituency. The probability of opposition falls rapidly until distances reach around 50 miles.

We ran another logit regression of opposition on indicators for constituencies at distances less than 20 miles, less than 25 miles, up to distances less than 50 miles from the matched constituency. The omitted group is constituencies at a distance more than 50 miles. The results can be summarized as follows: only the indicator variables for less than 20 miles and less than 25 miles are positive and significant, suggesting that groups within 25 to 50 miles were not significantly more likely to oppose bills than groups at a greater distance.

Figure 5: Locally Weighted Regression relating Opposition to Distance



What about the supporters of river bills? Although most were a similar distance from matched constituencies (approximately 25 miles), later we will see that the decision to support a bill was less sensitive to majority party strength. As we will argue the fact they did not increase their lobbying efforts suggests supporters' views were not as influential to majority party MPs as opposition groups. Therefore our finding of a *negative* relationship between the probability of a river act and majority party MPs within 25 miles makes more sense than a *positive* relationship.

Turning to other results in table 4 we find that contested elections in the constituency tended to lower the probability of an act, but the coefficient is not precisely estimated. Thus there is little evidence for a swing-constituency effect influencing river navigation acts. The results also

show that more voters in a municipal borough, greater density of voters in a county, and more MPs in the constituency increased the probability of a river act. The coefficient on city voters is the most sizeable and interesting. The logit coefficient (not shown) implies that a one-standard deviation increase in city voters increases the probability of a river act in a borough constituency by 171 percent. As the number of voters is linked with population, we think this finding suggests that greater population in a constituency increased the probability of acts. Population's effect could operate through the greater lobbying efforts of promoters who expected larger private gains in constituencies with large populations.

The results for market potential are interesting as they show that greater market potential among constituencies within 25 miles lowered the probability of an act. The odds ratio is hard to interpret as a one-unit change is tiny for this variable. The logit coefficient (not shown) implies that a one-standard deviation increase in market potential within 25 miles lowers the probability of a river act by over 90 percent. One explanation is that market potential signifies greater losses to opposition groups in nearby constituencies because the trade diversion effects and property damage are greater. If so then our theory predicts opposition groups should fight harder against bills when there is greater market potential. Later we find additional support for this argument.

The last key finding from table 4 is the positive and significant effect of Whig party rule and by implication the negative and significant effect of Tory rule. River acts are estimated to be 174 percent more likely in parliaments where the Whigs were in the majority. There are at least two explanations for the Whig effect just described. One is that Whig leaders pushed river bills as a part of their broader program of economic modernization. This argument sees river navigation as being similar to the Bank of England and draws on the views of Pincus (2009) and Pincus and Robinson (2012). A second explanation is that the Whigs were in the majority in years when it

was more profitable to undertake river navigation projects. One way of testing the second argument is to include more time-varying controls that would influence profitability like interest rates, the growth rate of coastal trade, and indicators for foreign wars and bad harvests.[16] When such variables are added to the random effects logit model, the Whig effect diminishes in magnitude and is no longer statistically significant.[17]

However, we do find interaction effects between Whig majorities and the number of majority party MPs. To see this we re-estimated our baseline model with an interaction between the Whig majority dummy and all variables. The first two columns in table 5 show the direct effect of each variable and the last two show the interaction effect with the Whig dummy. The interaction effects are significant for a few important variables. The odds ratio is significantly lower for majority party MPs within 25 miles of the constituency when the Whigs were in the majority. This is an intriguing finding because it suggests the Whigs were more likely to employ a strategy targeting rejections to opposition groups in constituencies where they had recently won seats. It fits some historians' assessment that the Whigs were a more cohesive party and were more effective in coordinating strategies (see Homes 1987). It also suggests the Whigs did not foster 'open access,' which runs contrary to the view they were more pro-development than the Tories.

[16] See Bogart (2011) for more details on these variables.
[17] The results are not shown to save space but are available upon request from the author.

Table 5: Probability of getting a River Act, Baseline Model with Whig Interactions

	Direct Effect		Interaction with Whig Dummy	
Variables	Odds Ratio	Standard error	Odds Ratio	Standard error
Number majority party MPs, constituency	0.901	0.617	2.273	1.804
Number majority party MPs, within 25 miles	1.197	0.266	**0.564**	**0.155**
Number of MPs, constituency	19.239	43.2	0.5709	0.979
Number of MPs, within 25 miles	0.823	0.193	1.372	0.343
Contested Election, constituency	0.74	0.681	0.93	0.343
Contested Election, within 25 miles	1.115	0.366	0.93	0.343
Whig Majority	**3.3E+125**	**5.1E+12**		
County constituency, constituency	0.0004	0.006	22.664	340.75
County constituency, within 25 miles	2.241	3.29	0.444	0.698
Voters in Borough, constituency	1.001	0.0017	1	0.0018
Voters in Borough, within 25 miles	0.999	0.0007	1	0.0007
Density of County Voters, constituency	1.881	2.214	0.895	1.035
Density of County Voters, within 25 miles	0.986	0.328	1.141	0.423
Market Potential, constituency	1	0.00002	0.99999	0.00003
Market Potential, within 25 miles	1	2.00E-05	0.9999	2.00E-05
Distance to navigable network, constituency	0.9823	0.0467	0.9873	0.048
Distance to navigable network, within 25 miles	1.0006	0.0048	0.9962	0.01

Time trend	**1.1911**	**0.124**	**0.8439**	**0.0765**
Constituency Random effects				yes
N				3536
Wald chi2(35)				19.43
Prob > chi2				0.984

Notes: Bold indicates statistical significance at the 10% level or below

VI.1 Robustness

In this sub-section we examine the robustness of our findings for majority party strength. There are two major concerns. First, there may be other unobservable economic characteristics that influence river navigation acts that are correlated with the distribution of majority party strength. Second interest groups may try to elect majority party MPs in order to influence river navigation acts. Arguably most of the omitted variables are time-invariant geographic factors so fixed effects would provide a solution. Therefore, our first check is to estimate a conditional fixed effects logit model and a linear fixed effects model. All time-invariant characteristics like market potential must necessarily be dropped. The coefficients are reported in table 6. The findings are consistent with earlier results. Also the odds ratio for most variables is generally larger in magnitude when compared with the analogous random effects model (see table 4). The conclusions in the linear model are again similar. In column 3, the -0.001 coefficient for majority party MPs within 25 miles implies that increasing their number by one lowers the probability of a constituency getting a river act (provided that it has not had one before) by 12% relative to the mean of 0.0087.

Table 6: Probability of getting a River Act, Fixed Effects Models

	Logit FE		Linear FE	
	(1)	(2)	(3)	(4)
Variables	Odds Ratio Standard error	Odds Ratio Standard error	Coefficient Standard error	Coefficient Standard error
Number majority party MPs, constituency	1.705	2.254	0.0026	0.0017
	0.554	1.46	0.0022	0.003
Whig*Number ruling party MPs, constituency		0.669		0.0016
		0.514		0.0049
Number majority party MPs, within 25 miles	**0.762**	0.823	**-0.001**	-0.0004
	0.094	0.122	**0.0004**	0.0004
Whig*Number majority party MPs, within 25 miles		0.792		**-0.0011**
		0.123		**0.0004**
Whig		**21.467**		**0.0138**
		26.83		**0.00074**
Contested Election, constituency	0.717	0.685	-0.002	-0.0025
	0.333	0.343	0.004	0.004
Contested Election, within 25 miles	0.995	1.02	-0.0012	-0.0013
	0.136	0.153	0.001	0.001
Constituency Fixed Effects	yes	yes	yes	yes
Year FE	no	no	yes	no
Time trend	no	no	no	yes
N	222	222	3536	3536

Notes: Bold indicates statistical significance at the 10% level or below

Columns 2 and 4 in table 6 include dummies for parliaments with Whig majorities and interaction terms. In column 4 the year FE are replaced with a time trend. The conclusions are similar to above suggesting the Whigs and Tories had different targeting strategies.

There is no simple solution to the reverse causation problem, but some reassurance can be provided by the use of instrumental variables. As discussed above, we instrument for the number of majority party MPs in and within 25 miles of a constituency with the number of majority party MPs in that constituency in the previous parliament and its interaction with a dummy that takes the value 1 if the majority party throughout the Commons changed in the most recent election. In seven of the parliaments listed in table 1 the majority party changed. Here constituencies that had more majority party MPs in the previous Parliament will likely have less majority party MPs in the current Parliament simply because national politics changed. As a constituency had little effect on the identity of the majority party throughout the Commons we treat this variable as exogenous. Thus the first stage is one of the following:

$$\#MPMPs_{it} = \mu_i + \delta_t + \gamma_1 \#MPMPs_{it-1} + \gamma_2 \#MPMPs_{it-1} * changemajorityparty_t + \varepsilon_{it}$$

$$\#MPMP25_{it} = \mu_i + \delta_t + \gamma_1 \#MPMP25_{it-1} + \gamma_2 \#MPMP25_{it-1} * changemajorityparty_t + \varepsilon_{it}$$

where $\#MPMPs_{it}$ is shorthand for majority party MPs in constituency *i* in parliament *t* *(*$\#MPMP25_{it}$ is defined analogously for majority party MPs within 25 miles of constituency *i), *$changemajorityparty_t$ is the dummy for parliaments when the majority party in the Commons had just changed, μ_i is a constituency fixed effect, and δ_t is a fixed effect for parliament *t*. The second stage regression is the linear probability model with constituency and year fixed effects. It is identical to specification 3 in table 6 except contested elections are omitted.

The results are reported in table 7. In column 1 there is a positive and significant relationship between majority party MPs in the constituency and the probability it has a river act.

In column 2 majority party MPs within 25 miles shows a negative and significant relationship. In column 3 when both variables are included the conclusions are the same. The first stage results show that when the majority party changed areas that had more majority party MPs in the previous parliament generally lost majority party MPs in the next parliament. Importantly, the f-stats for the instruments in the first stage are comfortably large suggesting there is not a weak instruments problem. Also important the over-identification tests do not call for a rejection of the exclusion restriction and further support the IV strategy.

Table 7: Probability of getting a River Act: fixed effects regressions using 2SLS

	1	2	3
Political variables	coefficient standard error	coefficient standard error	coefficient standard error
Number ruling party MPs, constituency	**0.008** **0.0038**		**0.0144** **0.001**
Number ruling party MPs, within 25 miles		**-0.0034** **0.0012**	**-0.0041** **0.005**
Year and Constituency FE	yes	yes	yes
N	3536	3536	3536
First Stage			
F-stat	100.41	47.18	
P-value	0	0	
Over-identification test			
Chi-square Stat	1.44	0.162	4.12
P-value	0.23	0.68	0.127
Endogeneity Test			
F-stat	2.36	6.29	3.93
P-value	0.125	0.012	0.02

Notes: Standard errors are clustered on constituencies. Bold indicates statistical significance at the 10% level or below.

Drawing on all the estimates to this point, one can draw the conclusion that access to river navigation companies was not 'open' in Britain. Recall that by our definition, open access implies that the political characteristics of constituencies have no effect on whether they got a river navigation act after conditioning on economic characteristics. The results clearly reject the open access criterion. Our theory is that Britain was not open access with respect to river navigation acts because the majority party targeted rejections to opposition groups where they had recently won seats. If this argument is correct then we might expect that groups should be more willing to oppose a river bill if the majority party was strong in their vicinity. After all one of the main points of opposition was to signal a constituency's desire to have a bill rejected. We now turn to an analysis of the political determinants of opposition to river bills.

VII. Analysis of Opposition and Support for River Bills

In this section our aim is to study the behavior of groups only in those constituencies who were likely to be affected by a river bill. Therefore we restrict the sample to constituencies less than 50 miles from any matched constituency in each parliament. We chose this range because as shown earlier most opposition groups were within 25 miles but some were as far as 50 miles. The resulting sample contains 1347 constituencies across various parliaments. For comparison we also analyze how majority party strength affected the probability of someone in a constituency supporting a bill. We do not expect to see any relationship here under the targeted rejections hypothesis.

The results are reported in table 8. The specification is slightly different from before using economic and political variables within 10 miles of a constituency only. The spatial scale is

smaller because there is more precise information on opposition locations. There are several important conclusions. First, a constituency was more likely to record opposition if there were more majority party MPs within 10 miles. It is consistent with our theory that greater majority party strength in an area encouraged opposition efforts and the effect was to reduce the probability of a river act occurring. Note also there is no relationship between support for bills and majority party MPs. Supporters behaved as though majority party strength was irrelevant.

Table 8: Probability of Having Opposition or Support to a River Bill Conditional on having a river bill introduced within 50 miles

	Opposition		Support	
Variables	Odds Ratio	Standard error	Odds Ratio	Standard error
Number majority party MPs, within 10 miles	**1.263**	**0.119**	1.0008	0.074
Number of MPs, within 10 miles	0.947	0.1	1.039	0.081
Contested Election, within 10 miles	0.847	0.124	0.932	0.11
Whig Majority	0.865	0.235	0.852	0.176
County constituency, within 10 miles	1.138	0.738	1.064	0.493
Voters in Borough, within 10 miles	**0.999**	**0.0003**	1.0002	0.0002
Density of County Voters, within 10 miles	0.856	0.185	1.0002	0.138
Market Potential, within 10 miles	**1.00002**	**0.00001**	0.999	7.14E-06
Distance to navigable network, within 10 miles	0.995	0.0039	0.998	0.002
Time trend	1.007	0.009	0.991	0.007
Constituency Random effects		Yes		Yes
N		1347		1347
LR chi2()		14.53		6.71

Prob > chi2	0.15	0.75

Notes: Bold indicates statistical significance at the 10% level or below

We also find that opposition to bills is more likely in constituencies with greater market potential. This is consistent with our earlier finding that having more market potential within 25 miles of a constituency lowered the probability of an act. As we argued earlier market potential may proxy for the losses from trade diversion and property damage and should therefore encourage opposition.

At this point there may be questions about whether promoters understood that more majority party MPs within 25 miles increased opposition efforts and therefore they chose not to introduce river bills because they were expected to be more costly to procure. We investigate this possibility by studying the relationship between political variables and the likelihood of a river bill being introduced in a constituency. In a variety of specifications, we find that bills are less likely with more majority party MPs within 25 miles, but the effect is smaller than for acts and not precisely estimated. It is possible that not all promoters were forward looking and did not take political characteristics into account when making their decisions about whether to introduce bills. Some may have been surprised that they faced opposition once their bill was introduced. Perhaps such bounded rationality is not surprising as it might have been difficult for all promoters to fully anticipate how majority party MPs would respond to their interests and those of opposition groups.

VIII. Implications for Britain's Navigation Development

Our results show that the distribution of majority party strength affected the probability of a river act in a parliament. In other words, politics limited access to river navigation companies in the short-term. It is reasonable to wonder whether it did so over the longer-term; that is over many parliaments. Frequent party turnover was one factor working to weaken limits on access. Majority party strength was rarely constant within most constituencies as many went in and out of the majority party with regularity. As a result, few constituencies were permanently at an advantage or disadvantage in getting river acts because of the combination of local and national politics. A counter-factual helps to make this point by considering an alternative scenario where 50 percent of MPs were with the majority party in all constituencies and all parliaments. In other words, every constituency is assumed to have the same degree of majority party strength given its number of MPs. Using the coefficients from our baseline random effects logit we predict the probability of a river navigation act in each constituency and parliament under the counter-factual and with the actual values for majority party MPs. Next we estimate the number of river acts throughout Britain under the counter-factual and observed cases.[18] Note that the predicted probability of an act assumes the random effect is zero, so our predicted number of acts is likely to be smaller than what we observe in the data. Lastly, we calculate the correlation between the predicted probability of ever getting a river act in a constituency in the counter-factual and observed data. A high correlation would indicate that a constituencies' probability was similar in the two settings.

Table 9 summarizes the results. In a counter-factual England and Wales where 50 percent of MPs were with the majority party in all constituencies, the number of river acts is predicted to be

[18] We incorporate the probability that there is no river act in a constituency previously. In other words, if there is a high probability of an act in parliament t then the estimated probability of an act in the next session should be lower all else equal.

similar as the model using the observed data. There would be a 12 percent decrease in acts which is relatively small. Also the correlation in the predicted probability of ever getting a river act is very high between the observed outcomes and the counter-factual (0.92). Our interpretation is that the regular churn in majority party strength meant that effectively all constituencies had similar majority party strength over the long-term and therefore no constituency was at a long-term advantage or disadvantage from majority party representation. The larger implication is that political limits on access had minimal consequences for Britain's long-run navigation development.

Table 9: Counter-factual River Development

Counter-factual Scenario	1 Predicted Acts	2 % difference from mean	3 Correlation with predicted probability in observed data
Every Constituency has 50% of its MPs with the ruling party in all Parliaments	16	-12	0.92

Note: the random effect is assumed to be zero in the predicted acts

One might argue that simply counting the number of river navigation acts is not entirely satisfying. In judging the consequences of limited access we would like to know whether river acts were assigned to the best locations. To address this issue we use our coefficient estimates on the control variables in the baseline random effects logit model in table 4. Conditional on political variables like majority party MPs, they identify how each characteristic affected the probability a constituency got a river act. For example, more voters in a municipal borough raised its probability presumably because more population increased the gains to river navigation. Multiplying each coefficient by the variable's value and then summing across all

control variables provides a metric for constituency 'quality' with respect to river navigation. If Britain's allocation process was effective then we might expect that among those constituencies where river bills were introduced, the quality metric should be higher for constituencies that got river acts (i.e. those constituencies where river bills succeeded). A regression analysis shows that this was indeed the case. Again it would appear that although Britain was limited access, the long-run consequences were not severe for its navigation development.

IX. Conclusions

There were remarkable changes in Britain's political system after the Glorious Revolution. One of the most important was the emergence of a competitive two party system. The Whigs and Tories traded places as the majority party in the House of Commons seven times between 1690 and 1741. At the same time Britain embarked on many new policies, including the establishment of numerous infrastructure authorities which extended market access through transport improvements. In this paper, we study whether party politics influenced the creation of river navigation companies in Parliament. Empirically we find that greater majority party strength in and near a constituency changed its probability of getting a river act even after controlling for economic characteristics. Our explanation is that the majority party employed a core constituency strategy where they targeted approvals to promoters in constituencies where they had recently won seats, but they also targeted rejections to opposition groups in constituencies where they had recently won seats.

More broadly we find that Britain did not make the full transition to open access in the decades after the Glorious Revolution. Some constituencies faced a higher barrier to entry because of the strength of the majority party nearby. However, party competition at the national

and local level meant that the majority party rarely controlled constituencies for long. Thus the effects of limited access were generally minor over the long-term.

We close by noting the broader implications of our approach. We introduce a theoretical model that could be used in any adversarial context where there is bias to some group because of their political characteristics. The model can be tested using micro-data and provides new insights on barriers to entry.

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