

The Politics of Development 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 link between politics and development. We study how political parties and rent-seeking affected the diffusion of developmental infrastructure projects. Focusing on river navigation companies, we provide evidence that the promotion, approval, and opposition to navigation projects depended on whether the Whigs or Tories were in the majority and whether a constituency was well represented by the majority party. Our broader conclusion is that the Whigs were more conducive to developmental projects than the Tories. We also conclude that majority party strength limited access to navigation companies in some constituencies in the short-run, but the long-run effect on infrastructural development was largely neutral because party turnover was high.

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I. Introduction

Many of today's institutions were created by elites before the advent of democracy and totalitarianism. They are often given labels like inclusive institutions, extractive institutions, or state capacity and are thought to have profound effects on current income levels.² However, there are reasonable doubts about which institutions are most important or whether elites can coordinate in making decisions that would later influence paths of development. This debate has been quite vigorous among scholars trying to explain the economic rise of Britain in the eighteenth century. One popular explanation emphasizes its system of checks and balances and representative government. The Glorious Revolution of 1688-9 is said to have weakened the Monarchy and solidified a strong and active Parliament (e.g. North and Weingast 1989). But many have argued that 'constraining the monarchy' was not the most important political aspect of Britain's development.³ If this is so, then what made Britain special?

One growing area of the literature emphasizes the role of the Whigs and Tories. The two political parties competed vigorously for control over the House of Commons from the 1690s to the early 1730s. Some scholars argue that parties had a profound influence on policy making. For example, Stasavage (2003) argues that Whig-rule enhanced the credibility of sovereign debt. Pincus (2009) and Pincus and Robinson (2011) claim that the Whigs favored more developmental policies than the Tories. But there is a counter-view suggesting that parties could not coordinate their economic policies and that they had broadly similar preferences. A related

² See Acemoglu, Johnson, and Robinson (2001), Acemoglu and Robinson (2009), Besley and Persson (2009).

³ See Epstein (2000), O'Brien (2001), and Cox (2011) for examples.

view argues that partly leaders mostly focused on national issues and paid less attention to local issues like the development of infrastructure and regulation.⁴

Another debatable aspect of Britain's development concerns the level of rent-seeking. It is thought that mercantilist ideologies were still strong in the early 1700s and that politicians regularly responded to interest group pressures by restricting entry into markets (Mokyr and Nye 2007, Harris 2000, O'Brien, Griffiths, and Hunt 1991). Drawing on this literature, North, Wallis, and Weingast (2009) argue that shortly after 1689 Britain was still a 'limited access order' in which politicians purposely distorted markets to achieve political aims. While limited access would appear to fit Britain well there are some important anomalies. For example, there was a dramatic increase in infrastructure authorities and family trusts authorized by Parliament after the 1690s (Bogart 2011, Bogart and Richardson 2011). This raises questions about whether access to organizations was beginning to open around the time of the Glorious Revolution.

We approach these issues from a new perspective by focusing on the leading edge of Britain's infrastructure improvement program: extensions in river navigation. Britain had 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 waterways near major rivers or the coast. After 1689 it was increasingly common for acts of Parliament to grant river navigation companies' fiscal and legal rights to undertake improvements. Local groups, like mayors and city councils, promoted projects through parliamentary bills and were often named as trustees or owners of navigation companies if the bill passed and became an act. The problem from the promoter's perspective was the stiff

⁴ For the literature on Britain's parties see Holmes (1987), Horowitz (1977), Harris (1993), Hoppit (2000), Speck (1970).

opposition from powerful vested interests. Neighboring cities and landowners argued for the rejection of 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.

Our analysis focuses on how the identity of the majority party in the Commons and the political characteristics of constituencies influenced the diffusion of river navigation acts. We develop a theoretical framework to analyze a promoter's decision to introduce a bill for river navigation in the Commons and an opposition group's decision to fight the bill. Our model combines theories of persuasion and conflict (Skeperdas and Vaidya 2012) with redistributive politics (Cox and McCubbins 1986; Dixit and Londregan 1996). The probability of a river bill succeeding and the likelihood of a river bill being introduced in a constituency depend on the benefits and costs of the project as well as the political bias towards promoters and opposition groups. We investigate three potential channels of political bias. First, a party preference effect where either the Whigs or Tories favor river navigation bills in general. Second, a core constituency effect where the majority party targets approvals or rejections to constituencies in the Commons where they are more strongly represented. Approvals are targeted if the constituency favors the project and rejections are targeted if they oppose the project. Third, a swing constituency effect where the majority party targets approvals or rejections to constituencies that have recently had competitive elections

We estimate a reduced form equation for the probability that a constituency in the Commons has a river act in each parliament. The empirical analysis is based on new data classifying the party affiliation of all Members of Parliament (MPs) representing municipal boroughs and county constituencies in the House of Commons between 1690 and 1741. We also use the *History of Parliament* series (Cruickshanks, Handley, and Hayton 2002 and Sedgwick

1970) to identify which constituencies had contested elections, a proxy for political competition. With this data we construct measures of majority party strength and political competition in a constituency and its neighbors. From other sources we also know which constituencies had river improvement bills within their boundaries in each parliament, which succeeded and became acts of Parliament, and who promoted, supported, and opposed bills through petitions.

The 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 then the probability was significantly lower. Consistent with this finding we show that opposition to river navigation bills was more likely within 25 miles of a constituency with a river bill and that incidences of opposition were more likely in constituencies where the majority party was strong. 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 target rejections to opposition groups in constituencies where they had recently won seats. By contrast we find little evidence for a swing constituency effect. The probability of river acts was little different in or near constituencies with contested elections. Regarding the Whigs and Tories, we find that parliaments where the Whigs had the majority are associated with more river acts and that the Whig effect is strongest before 1720. There is also evidence that the Tories gained more seats near a constituency when they rejected bills, suggesting they obstructed navigation bills for electoral gains.

Our general conclusion is that party politics influenced economic outcomes in Britain after the Glorious Revolution. The passage of economic legislation differed depending on whether the Whigs or Tories were in the majority and whether a constituency was well represented by the majority party. As to the role of each party specifically, there is some

evidence that Whig rule favored developmental projects. Improvements in river navigation dramatically lowered transport costs and likely changed the economic geography of regions.

Our results agree with the literature that rent-seeking was a problem in Britain after the Glorious Revolution and that it had not yet transitioned to open access. However, we also show 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 always had 50 percent of its MPs with the majority. The number of acts and distribution across constituencies is found to be similar to the observed data.

A broader lesson from our paper is methodological. Not enough is known about the mechanisms linking institutions and development even though the literature has become vast. The theoretical literature has begun to propose such mechanisms but more needs to be done.⁵ Our theoretical framework suggests one way of uniting models of lobbying and persuasion with models distributive politics. It also illustrates how the implications of a theoretical model linking politics and development can be tested to yield new insights.

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

⁵ For example, theoretical work on political competition by Besley, Persson and Sturm (2010) suggests new directions for empirical work. Another example by Alston, Harris, and Mueller (2012) addresses property rights in frontier contexts.

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 landowners, especially country gentleman. The Whigs drew more support from merchants and large landowners. Third, leadership of the two parties differed. A small group of party managers 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 and it is thought to have been moderately successful in uniting the diverse Tory party. After 1721 the Whigs were the dominant party for several decades in part 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 majorities 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.

Contested elections were common throughout the period from 1690 to 1741. A contested election is defined as an election with more candidates than seats. 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. 40 percent is large compared to other periods in British history like the mid-eighteenth century.

Table 1: Parliament and the Majority Party 1690-1741

Parliament	Majority Party	Percentage of constituencies where last election was contested
1690-1695	Tory	46
1695-1698	Whig	35
1698-1700	Whig	43
Jan. 1701	Tory	35
Nov. 1701	Whig	34
1702-1705	Tory	36
1705-1708	Tory	44
1708-1710	Whig	38
1710-1713	Tory	50
1713-1715	Tory	36
1715-1722	Whig	47
1722-1727	Whig	54
1727-1734	Whig	47
1734-1741	Whig	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.

Much of the literature on British political history in the aftermath of the Glorious Revolution agrees that religious, constitutional, and foreign policy were influenced by party politics. Regarding fiscal policies a link has been made between the Whigs and the growth of government debt. 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 and therefore the eventual dominance of the Whigs mattered for the credibility of sovereign debt. Pincus and Robinson (2012) make a forceful argument against the Tories on a wide range of economic policies. In their view, “The Tories would not have created the Bank of England, an institution that provided crucial loans to new manufacturing initiatives. Tories would not have wanted a standing parliament that could legislate over such a wide swath of social and economic life. The Tories would not have passed the series of turnpike acts, for example, that did so much to improve Britain’s economic infrastructure.”

Some historians have taken a different perspective arguing that the Tories and Whigs were more similar than different in terms of their economic policies. Essentially the argument is that they were both elites with a common mercantilist vision of the economy (Pocock 1985). Another critique is 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 organizations 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).” Although less effective than modern parties, Holmes’ last statement leaves open 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 whom he notes were a more unified and coherent party than the Tories (p. 245).

There is a related literature on the role of interest groups in influencing 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 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 there were proximate to majority party MPs. One of the most important changes in economic policy after 1690 was the growth of legislation changing property rights to land and infrastructure. Historians who have studied these acts have hinted at links between interest groups and partisan struggles in the Commons, but have yet to provide conclusive evidence.⁶

Parliament’s approach to rent seeking has been linked with larger narratives about why Britain was the first to industrialize. Mokyr and Nye (2007) argue that rent-seeking waned in Britain because of Enlightenment thinking led by Adam Smith and others. The result was that industrial technology and markets could flourish. North, Wallis, and Weingast (2009) argue that Britain is one of the few countries that transitioned to open access with the effect that entry into markets

⁶ See Handley (1990), Hoppit (1996, 1997), and Knights (2011) for discussions of the politics of legislation.

and organizations became freer. While these works emphasize different aspects, they agree that Britain after the Glorious Revolution was not yet on the doorstep to development.⁷ Mokyr and Nye state that in the decades following 1689, rent-seeking activity was the norm (p. 56). North, Wallis, and Weingast argue that Parliament was active in maintaining the institutions that allowed vested interests to block new charters for corporations (p. 217). If North, Wallis, and Weingast are right then presumably political parties would have been crucial in maintaining restrictive institutions as they were the main actors in Parliament.

II.1 River Navigation Acts

We contend that much can be learned about the politics of Britain's development by studying river navigation acts—a key example of legislation changing property rights after 1689. 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 conditions 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.

⁷ See also Zahedia (2011) for a similar view.

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 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

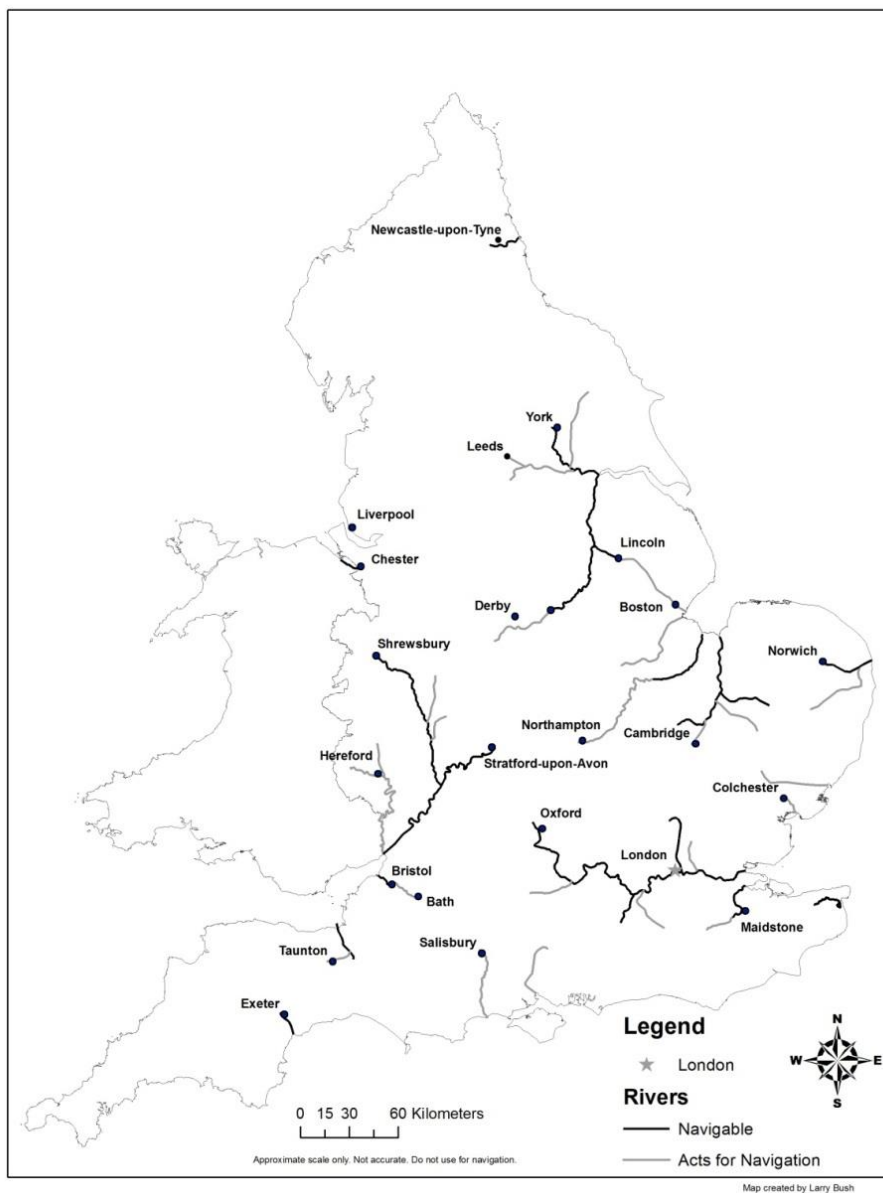
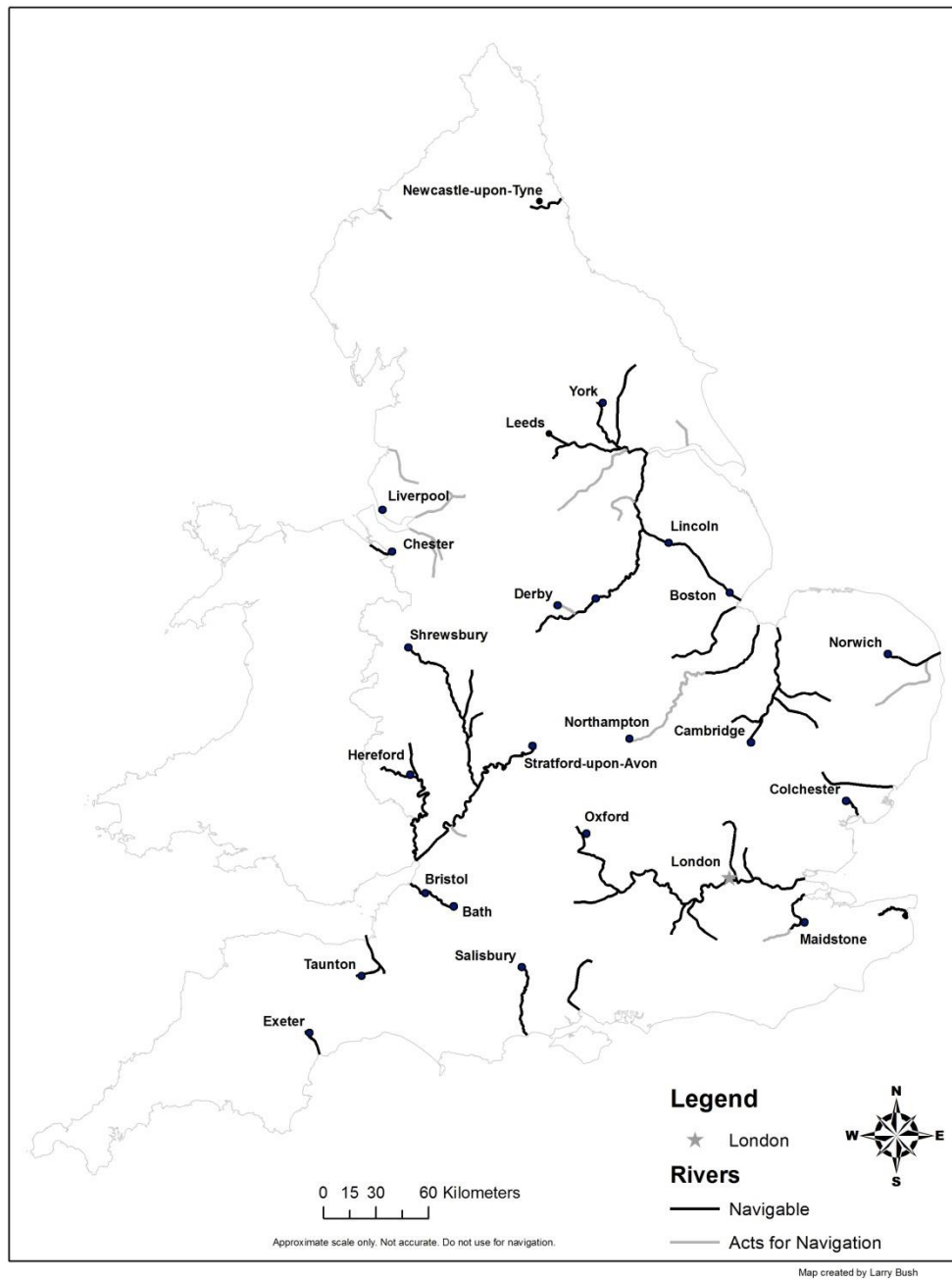


Figure 2 illustrates the extension of river navigation from 1715 to 1741. Now the black lines show rivers that were navigable in 1690 or were made navigable through acts before 1715. In this second period, river navigation extended to a number of cities in the North including Manchester and Sheffield. 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).⁸ The high failure 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.

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

	1	2	3
Period	Bills	% that became Acts	% 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 House of Commons (see table 2). Opposition groups used a variety of arguments including property damage, employment loss, and trade diversion. The River Avon bill provides an example of their arguments. After a committee was formed in the House to consider the Avon bill in January of 1712, there was a flurry of petitions opposing the bill or expressing concerns.⁹ Henry Parsons, who owned six mills on the river Avon, stated in a petition that his mills would be rendered useless to the great loss of the poor and to himself. He prayed that ‘the bill may not

⁸ 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.

⁹ The details of the petitions related to this bill are available in the Journals of the House of Commons, 1712.

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 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. 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 politics and local party representation 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 propose a theoretical framework in the next section. It gives a set of testable predictions that will help in analyzing the data.

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 , a benefit to users coming from lower transport costs g , and social losses to opposition groups l which we can think of as property damage or lost income from trade diversion effects. If the project is approved then financial returns, user benefits, and losses are realized otherwise all payoffs are normalized to 0. The social benefit to cost ratio for a project is $s=(b+g)/l$. Efficient projects are those where $s>1$.

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 MPs in the Commons trying to influence their decision on bills. Applying Skeperdas and Vaidya's model gives a function for the probability p that the Commons approves a bill, $p = \frac{\pi\varphi e_p}{(1-\pi)(1-\varphi)e_o + \pi\varphi e_p}$, where $\varphi \in [0,1]$ corresponds to the quality of the project, $\pi \in [0,1]$ corresponds to the bias of

the Commons in favor of the project, and e_p and e_o are the efforts of the promoter and opposition in producing evidence. Higher π , higher φ , or more effort by the promoter increases the probability of success all else equal. More effort by the opposition decreases the probability of success all else equal. We now discuss each of these factors in turn.

We think it is natural to assume that project quality has a direct effect on the probability success function. We let φ be a non-decreasing and differentiable function of s , the ratio of social benefits to costs, where the slope $\varphi'(s)$ defines parliament's increased preference for projects that have higher social benefits to costs. One could imagine that societies whose leaders try to balance development and efficiency would exhibit a φ function that is more responsive to s . Other societies whose leaders are indifferent to efficiency considerations would exhibit a φ function far less responsive to s .

The π parameter also relates to politics. If promoters operate in a world of open access then π would be constant for all, but if politics works to limit access then π will vary with parties and the political characteristics of constituencies who are influenced by the project. We have three potential channels in mind for the limited access setting all of which come from well-known models in political science. The first involves parties directly. If the Whig party was more favorable to river navigation projects then π would be larger for all projects in years when the Whigs were the majority party in the Commons. We call this the 'party preference' effect. Second, parties may want to reward those who supported them in recent elections. Here there are two 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). The third possible channel relates to political competition. Parties may want to direct rewards to constituencies where elections are close, also known as swing constituencies (see Dixit and Londregan 1996). Again here there are two sub-cases. If voters in the swing-constituency favor the river project then π is higher and if voters in the swing constituency do not favor the project then π is lower. We label this the ‘swing-constituency’ effect.

The final factors influencing the probability success function are the efforts e_p and e_o . We treat these decisions as endogenous and model them directly using the tools of contests.¹⁰ The objective function for the promoter is $pb - ce_p$. The first term is the probability the bill is approved $p = \frac{\pi\varphi e_p}{(1-\pi)(1-\varphi)e_o + \pi\varphi e_p}$ 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.¹¹

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: $e_o^* =$

$$\frac{l}{b} e_p^* = \frac{\pi\varphi(1-\pi)(1-\varphi)l^2}{bc[(1-\pi)(1-\varphi)l/b + \pi\varphi]^2}.$$

Notice that the ratio of the equilibrium efforts e_o^* and e_p^* is equal to

¹⁰ We refer the reader to Konrad (2009) for a good overview of contests.

¹¹ 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.

the ratio of losses to benefits $\frac{l}{b}$. After simplification, one can show that the equilibrium success function has the form $p^* = \frac{\pi\varphi}{(1-\pi)(1-\varphi)\frac{l}{b} + \pi\varphi}$ and that p^* increases in π and b and decreases in l .¹²

III.1 Modeling Bill Promotion

The next step in our theoretical framework examines the promotion of bills and the decision to oppose to bills. The expected payoff to the promoter if they introduce the bill simplifies to the expression bp^{*2} where $p^* = \frac{\pi\varphi}{(1-\pi)(1-\varphi)\frac{l}{b} + \pi\varphi}$. In order to introduce the bill a promoter must incur a fixed cost $F_p + \varepsilon$ where F_p is a constant and ε is a random variable. We assume that the promoter observes the fixed cost $F_p + \varepsilon$ and 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 equal to $f(bp^{*2} - F_p)$. Note that because p^* is a function of b , l , φ , and π and because f is an increasing function of p^* our comparative statics are the same as p^* . For example, if π is small because of some political bias then the likelihood of a bill being promoted is lower.

We carry out a similar analysis for the opposition. Assuming some bill has been introduced by a promoter, it 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

¹² 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 decrease. The reason is that lobbying efforts payoff the most when the Commons does not have a strong bias in favor or against promoters.

above. If the opposition does not oppose the bill 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 $l(1 - p^*)^2 - F_o - \varepsilon > 0$. Again if we let f be the c.d.f. for ε then we have an expression for the probability of opposition to a bill equal to $f(l(1 - p^*)^2 - F_o)$. Note that if an opposition group is well represented by the majority party then according to the core constituency effect it is more likely to oppose because π is lower and hence p^* is lower.

III.2 Summary

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: $p^* \times f(bp^{*2} - F_p)$. Our predictions concerning the party preferences effect are clear. If the Whigs favored river navigation bills, then promoters in all constituencies should have been more likely to introduce bills and get acts under Whig majorities. The opposite should hold under Tory majorities. For our core and swing constituency effects we need to know the geographic distribution of supporters and opponents of bills to make clear predictions. 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 a bill and act there. Also if we assume opponents are more common in the vicinity of a constituency, say within 25 miles, then more majority party MPs within 25 miles of that constituency should decrease its likelihood of having a bill and 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 development. 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.¹³ The petitions are particularly useful because they identify the aims of the bill, the groups supporting the bill, and those opposed. Based on their description, bills that proposed to create river navigation companies are separated from bills that amended rights to existing organizations. 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 earlier parliaments but had failed.

The constituency is the spatial unit of analysis in our study. Each constituency is one of two types: a county or a municipal borough. There were over 200 boroughs and 45 counties. Counties were known as ‘shires’ and most 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. The smallest were called ‘rotten’ because they had few electors and were considered corruptible. Interestingly, there are a number of economically important cities like Manchester that are not a borough and are represented in the Commons through 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

¹³ 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.

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 set summarizing the party affiliation of every MP. As a result we had to construct such information from primary and secondary sources. The data and procedures are described in a separate paper (Bogart and Oandasan 2012). To briefly summarize 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 lists which identify party affiliation directly or voting on major pieces of legislation associated with the leaders of the two parties.

The party affiliation of each MP is used to measure the number of majority party MPs in each constituency 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. Darker symbols or counties are constituencies where

the majority party was strongly represented.¹⁴ 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 switched from the Tories to the Whigs between 1708 and 1710.

We also measure the number of majority party MPs in the area surrounding each constituency. To do this we linked 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. Next the number of majority party MPs and the number of total MPs are calculated at various distances ranging from 10 to 35 miles. As explained later, we want to identify the geographic scale that contains most supporters and opposition groups.

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. As with MPs, we calculate the number of constituencies with contests at distances ranging from 10 to 35 miles. From the same sources we also know the number of voters in each county or borough. The general rule was that 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.

¹⁴ 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 MP's tenure. A constituency is considered 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 constituency has mixed representation if the fraction of MPs in the ruling party is in-between 0.2 and 0.8.

Figure 3: Geography of Majority Party Representation in 1708

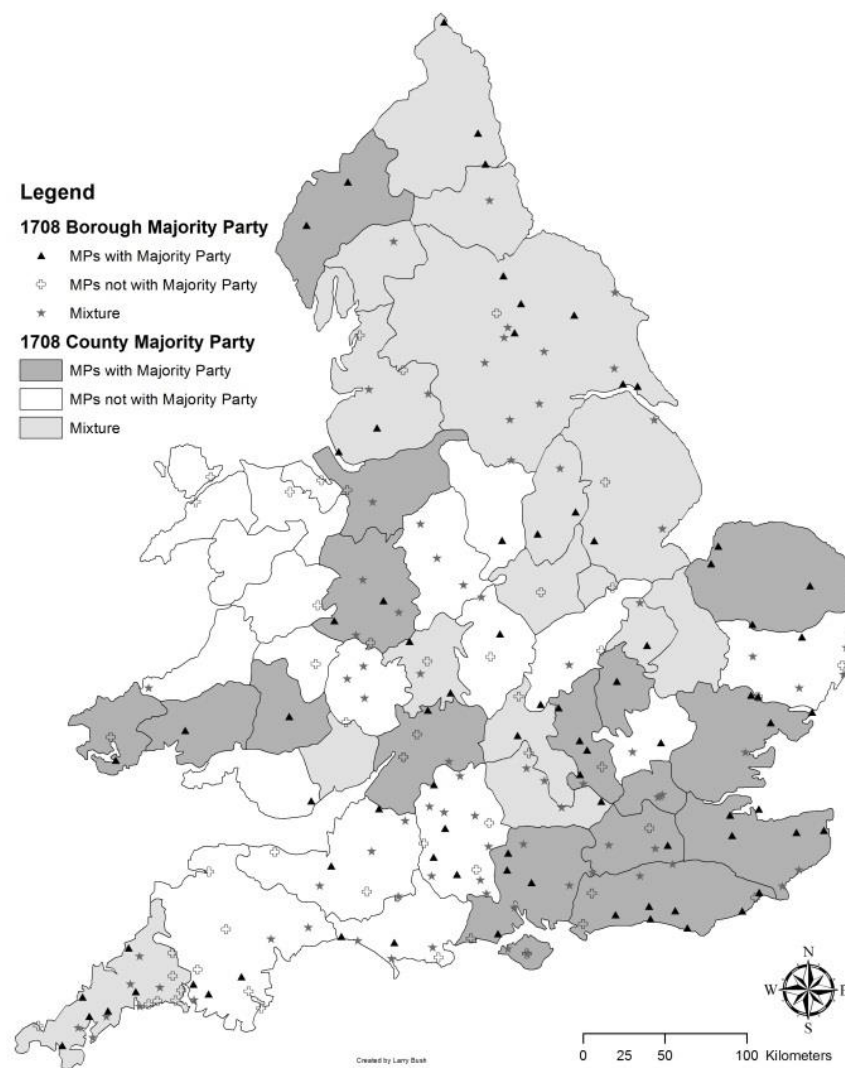
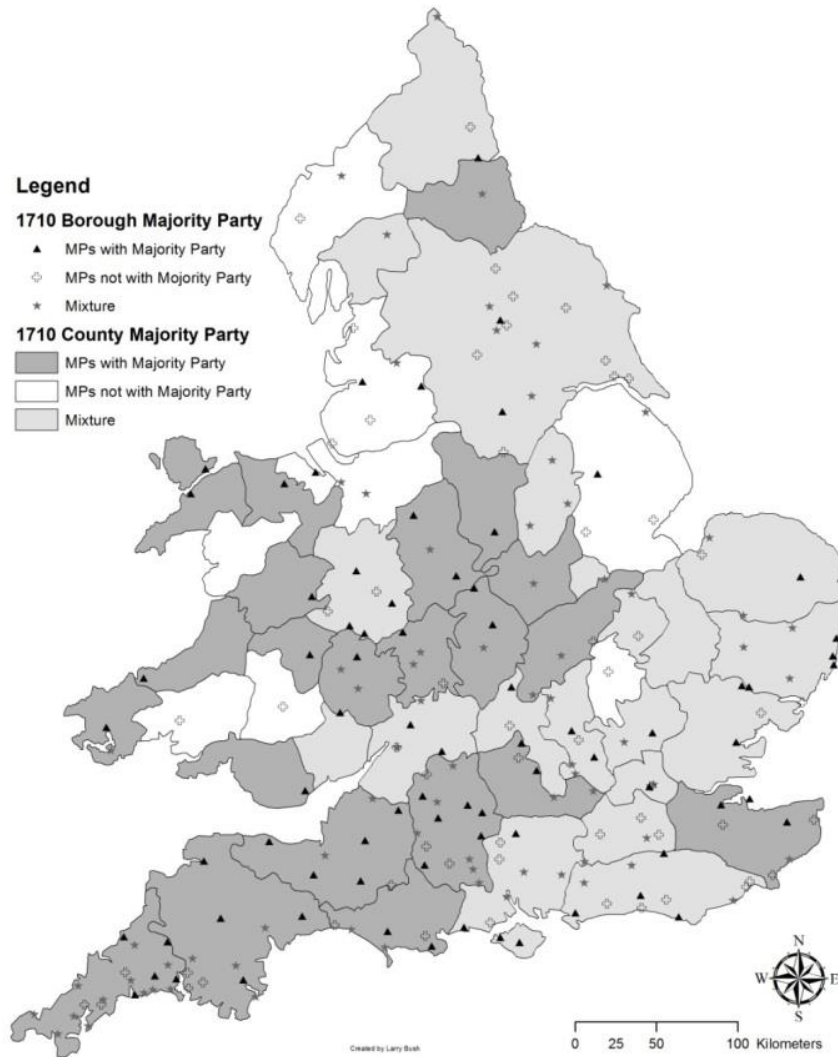


Figure 4: Geography of Majority Party Representation in 1710



Demand for river improvements is potentially 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 67 largest cities in England.¹⁵ As an illustration take a three city example, Chester, Liverpool, and Shrewsbury with populations of 10,000, 15,000,

¹⁵ Our list of top cities and their population in 1700 comes from Corfield (1982).

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 benefits to navigation promoters 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 bills and acts are shown in the top table 3. The likelihood of a constituency ever having a river bill in its jurisdiction between 1690 and 1741 is 18 percent. The proportion ever having a river act is lower at 12 percent as not all bills passed. Within the any individual parliament the probabilities of a constituency getting an act, provided it has not had one before, becomes even smaller at 0.9 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. As it turns out 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. Lastly 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 at least one River bill introduced	268	0.179	0.384	0	1
Dummy for Constituencies with at least one River Act	268	0.119	0.324	0	1
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 the identity of the party in power, majority party strength near a

constituency, and contested elections 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 it has not had a river act in any previous parliament. If constituency i has had a river act in any parliament then it is dropped. Otherwise, let $y_{it} = 0$. 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 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 reported they resided in or very near the matched constituency, we include each constituencies' characteristics, like the market potential, the number of MPs, the number of majority party MPs, and so on. Note in this specification 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. Thus we examine several alternative models where we sum constituency variables within a certain radius of each constituency. For example, in one model we include the sum of the market potential for all constituencies within 10 miles of constituency i , the number of MPs within 10 miles, the number of majority party MPs within 10 miles, and so on. In the next model we do the same for distances less than 15 miles from constituency i and continue for sets of variables up to 35 miles distant. In

the final step, we then test which model gives the highest chi-square statistic for joint significance and focus on that for the remainder of the analysis.

The logit model provides a useful specification relating $\text{prob}(y_{it} = 1)$ to a set of variables labeled x_{it} . We begin with a parsimonious logit model where each economic and political variable for a constituency and its surrounding constituencies, say within 10 miles, enters individually as an explanatory variable along with a time trend and indicator for years when the Whigs were in the majority.¹⁶ We also include a constituency random effect u_i to address unobservable factors uncorrelated with our variables of interest. The random effects model makes some strong assumptions so we also estimate a conditional fixed effects logit model and a linear probability model with fixed effects for each constituency and for each parliament. In the linear model we estimate $y_{it} = \alpha + \mu_i + \delta_t + \beta x_{it} + \varepsilon_{it}$ where μ_i is a vector of fixed effects for each constituency, δ_t is a vector of fixed effects for each parliament t , and ε_{it} is the error term. The advantage here is that we control for any time-invariant unobservable factors correlated with our variables of interest. 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.

We also employ an instrumental variables (IV) strategy as there may be additional concerns about endogeneity. Constituencies that had more ruling party MPs in the previous

¹⁶ Note also that some characteristics in x_{it} are common across all constituencies but vary across time, like whether the Whigs were the majority party. Some are fixed within a constituency across time, like the distance to the navigable waterway network c.1690. Others vary within constituencies over time, like the number of majority party MPs in a parliamentary session.

parliament are likely to have fewer in the current session if there was a change in the majority party in the House of Commons. As each constituency had little effect on who was the majority party in the Commons, we can treat global changes in the majority party as exogenous to the bill promotion decision in a constituency. We discuss the details of the IV strategy below.¹⁷

After establishing the effect of political and economic characteristics on the diffusion of river acts we turn to an analysis of the mechanisms. We study the connection between political characteristics and the promotion of river navigation bills to identify whether promoters were forward looking. An alternative model would assume promoters did not fully understand how the political characteristics in their area would influence their probability of an act. We also study if political characteristics influenced the success of bills conditional on their introduction in the Commons. Furthermore, we study the incidence of opposition and support to bills. We test our models' prediction that groups will be more likely to oppose bills if they have stronger representation by the majority party. Lastly, we study how the failure of bills affected the local electoral success of the majority party. Our results yield insights on why the Whigs and Tories treated river bills differently.

VI. Results

All our specifications include political and economic variables for each constituency and the sum of these variables for constituencies within some distance. The first step is to establish the appropriate spatial scale for the second set of variables. We do this by estimating six separate random effects logit models, each including variables for all constituencies within 10, 15, 20, 25, 30, or 35 miles. The specification that includes variables within 25 miles had the highest chi-

¹⁷ 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.

square statistic and so we focus in it for the remainder of the analysis. A distance of 25 miles makes good sense for reasons we shall discuss momentarily.

Table 4 reports the odds ratios and standard errors for all variables in our baseline random effects logit model. There are several important results. First we find evidence for a core-constituency effect. 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 significantly lower. Most constituencies had zero, one, or two majority party MPs, so increasing from zero to one or from one to two is estimated to increase the probability by 55 percent. The odds ratio for majority party MPs within 25 miles is also substantial given that the standard deviation of this variable is approximately 6.

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	

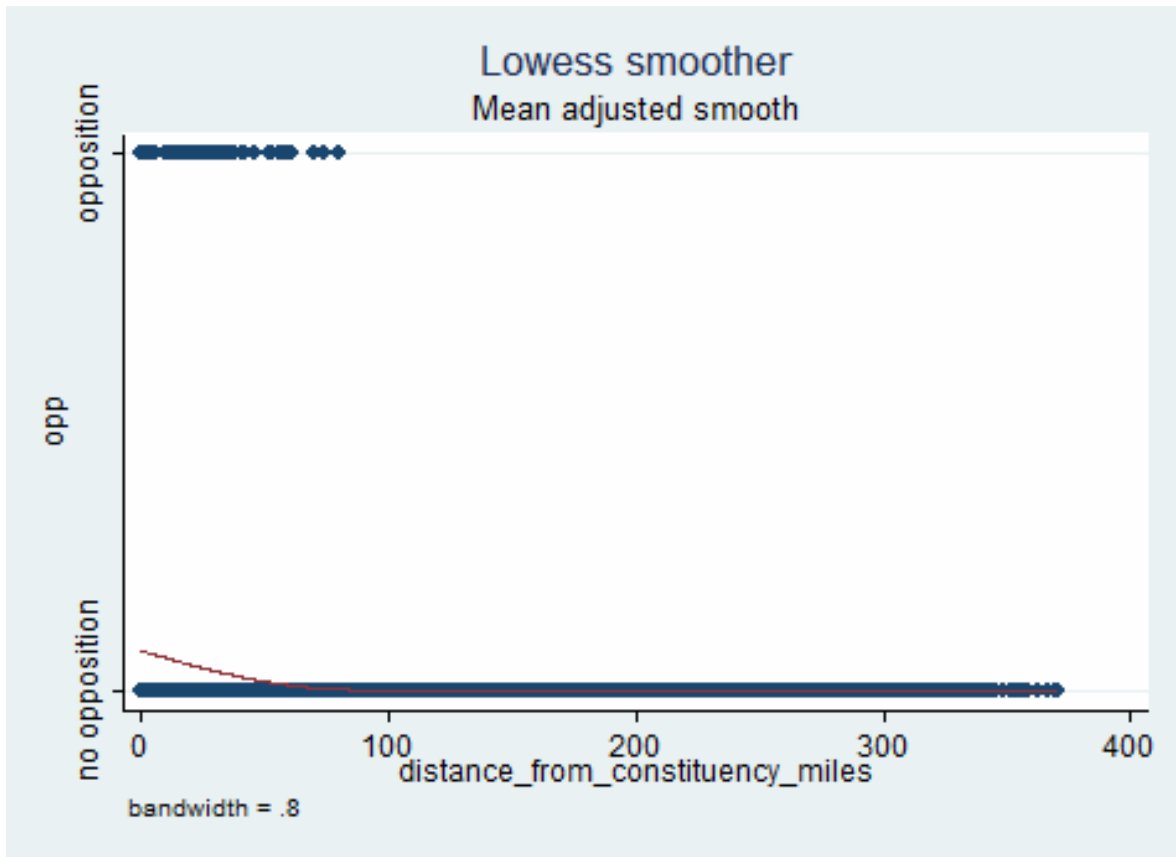
Notes: Bold indicates statistical significance at the 10% level or below

Our explanation is that the majority party wanted to target approvals to promoters in constituencies where they had recently won seats, but they also wanted to target rejections to opposition groups in constituencies where they had recently won seats. As promoters tended to reside near the constituency we think it makes sense that more majority party MPs in a constituency increased the probability of acts all else equal. If opposition groups tended to reside in constituencies within 25 miles then the low odds ratio for constituencies with more majority party MPs within 25 miles also makes sense. Some supporting evidence is provided by 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. The Figure 5 plots the smoothed estimates along with the raw data on 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. The omitted group is constituencies at a distance more than 50 miles. Only the indicator variables for less than 20 miles and less than 25 miles are significant, suggesting that groups within 25 to 50 miles were not significantly more likely to oppose bills than groups at a greater distance.

What about the supporters of river bills? A similar analysis shows that most were a similar distance from matched constituencies (approximately 25 miles). Later we see that the decision to support a bill was less sensitive to majority party strength. 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.

Figure 5: Locally Weighted Regression relating Opposition to Distance

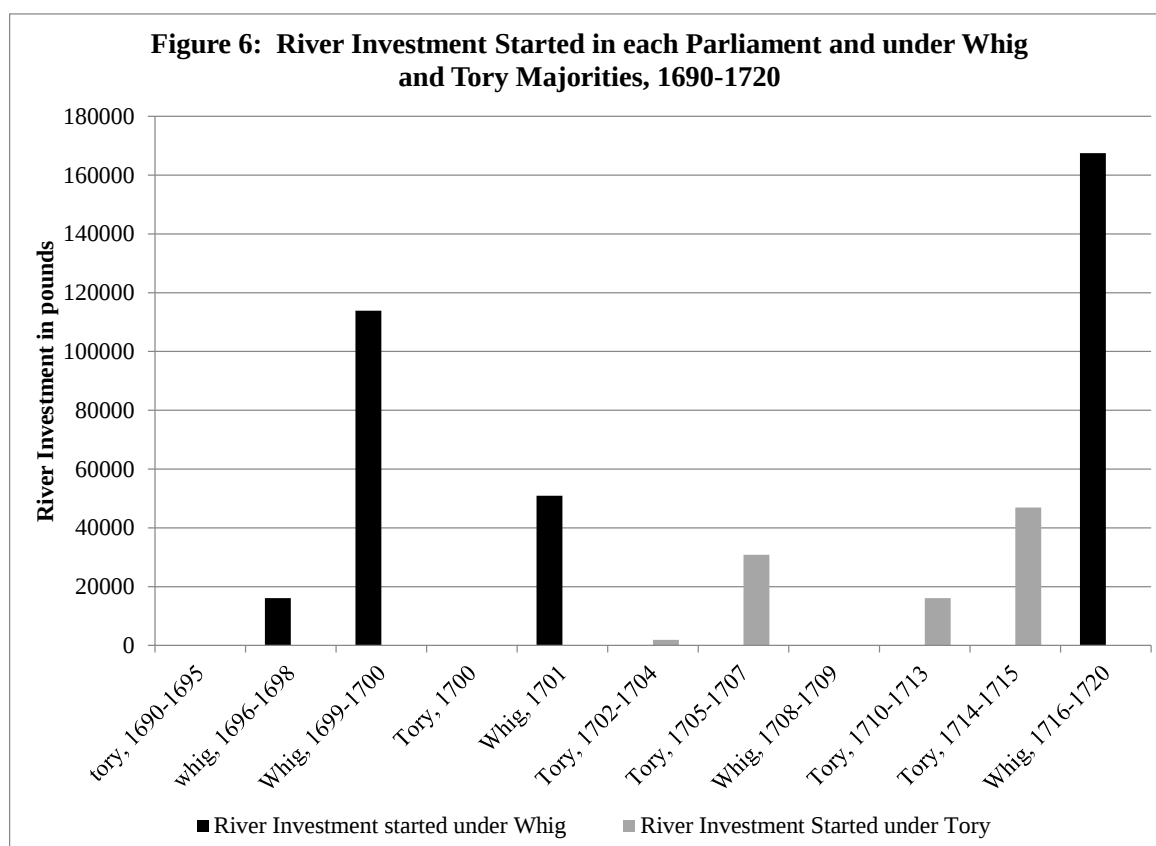


Turning to other results in table 4 we find that contested elections in the constituency tended to lower the probability of an act, but the coefficient is not precisely estimated. Thus there is little evidence for a swing-constituency effect influencing river navigation acts. The results also show that 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. We think this suggests that greater population increased the probability of acts. Its effect could operate through the efforts of promoters or Parliament's preference for projects with higher social benefits to cost.

The results for market potential are interesting as more market potential within 25 miles lowered the probability of an act. One explanation is that market potential raised the losses to

opposition groups. Recall that our theory predicts opposition groups should fight harder against bills if they expect to suffer greater losses. We might expect trade diversion effects and property damage to be greater if constituencies within 25 miles had greater market potential.

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. To illustrate the Whig effect differently we show the amount of river investment that was started (i.e. approved by an act) under each Parliament from 1690 to 1720.¹⁸ We also note whether the Whigs and Tories were in the majority in each Parliament. As Figure 6 shows more investment was started under Whig majorities than Tory majorities.



¹⁸ The investment data come from Bogart (2011)

There are at least two possible explanations for the Whig effect just described. One explanation 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). River navigation projects were controversial much like the Bank. They had the potential to increase domestic trade but they were also quite expensive and risky. The Whigs could have been more open to such projects. A second explanation is based on the different economic interests supporting the two parties. The Tories were generally supported by landowners, especially country gentlemen. If they tended to oppose river navigation more than say merchants or large landowners then the Tories might have discouraged river navigation acts because it was politically expedient. The second explanation has some testable implications which we will examine below.

Before accepting that there is indeed a difference between the two parties, it is important to check for omitted time confounding variables. Table 5 reports the odds ratio for the Whig majority variable in a model that drops the time trend and includes variables for the diffusion of river navigation projects across Britain, a proxy for interest rates, the growth rate of coastal trade, a dummy for foreign wars, and a dummy for bad harvests.¹⁹ The coefficients on other variables are omitted to save space. In this specification Whig majority is no longer statistically significant, but the coefficient remains sizeable. River acts are estimated to be 140 percent more likely when the Whigs are in the majority.

¹⁹ See Bogart (2011) for more details on these variables.

Table 5: Probability of Getting a River Act, Baseline model with more Time Variables

Variables	Odds Ratio	Standard error
Whig Majority Dummy	2.401	1.334
Other Time Variables		
Number of River Miles Approved in previous sessions over all Miles Ever Approved	5.321	16.508
Rate of Return on Charity Assets	9.402	21.792
Growth rate of Coastal Trade	1.325	0.456
Dummy for Foreign Wars	0.514	0.483
Dummy for Bad Harvests	1.238	1.032
Other variables included	yes	
Constituency Random effects	yes	
N	3536	
Wald chi2(22)	23.9	
Prob > chi2	0.327	

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

There could also be interaction effects between Whig majorities and the other political variables like majority party MPs. We re-estimated our baseline model with an interaction between the Whig majority dummy and all variables. Table 6 shows the results. The first two columns show the direct effect of each variable and the last two show the interaction effect with the Whig dummy. The interaction effects are significant in only a few cases. Most importantly the odds ratio for majority party MPs in the constituency is higher when the Whigs were in the majority and is significantly lower for majority party MPs within 25 miles of the constituency

when the Whigs were in the majority. Thus the estimates suggest that the Whigs were more likely to employ a strategy targeting approvals to promoters in constituencies where they had recently won more seats and targeting rejections to opposition groups in constituencies where they had recently won seats. To illustrate how the effects of majority party strength were quite different under the two parties figure 7 shows the predicted probability of an act as the fraction of majority party MPs within 25 miles increases.²⁰ Under the Tories, majority party strength modestly increases the probability while the opposite is true for the Whigs. One explanation is that the Whigs were more effective in coordinating the political strategies within their party. This would fit Holmes' (1987) assessment that the Whigs were a more cohesive party.

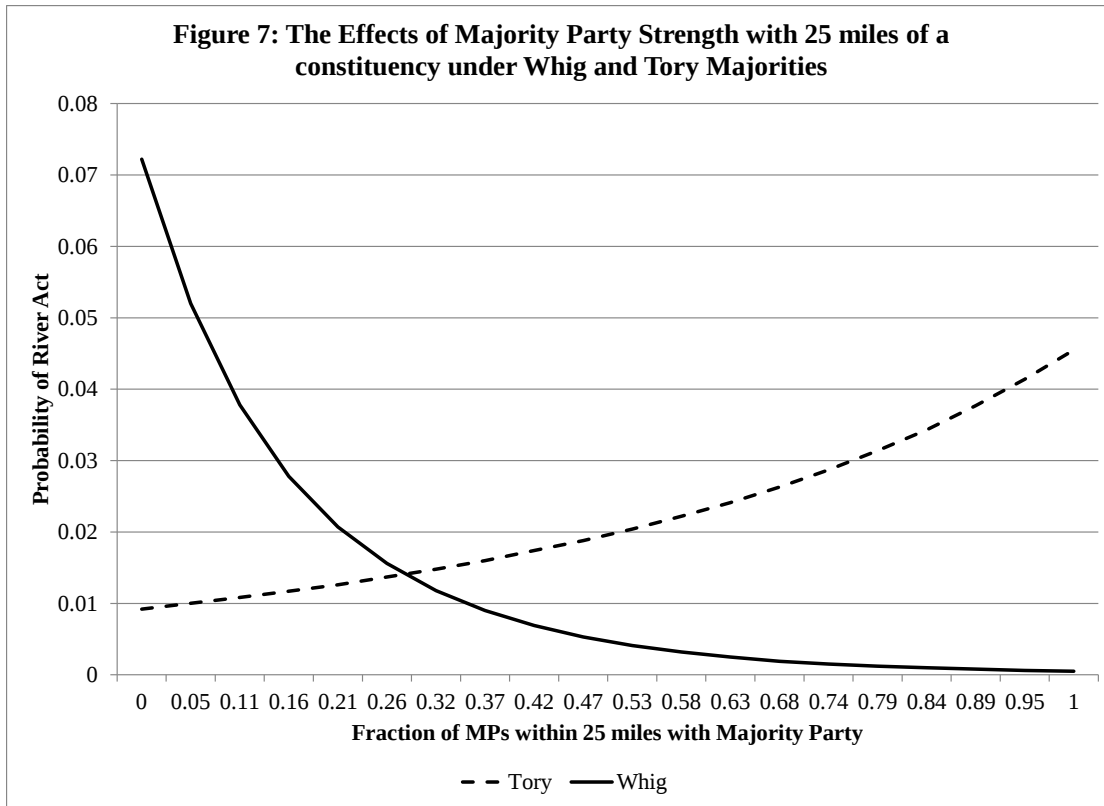
Table 6: Probability of getting a River Act, Baseline Model with Whig Interactions

Variables	Direct Effect		Interaction with Whig Dummy	
	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

²⁰ We replace every observation with the new majority party strength and then calculate the predicted probability for all constituencies using the coefficients. Then an average is calculated over all predicted probabilities to get the total predicted effect.

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



Timing is also important in interpreting the Whig effect. There is a negative interaction between the Whig dummy and the time trend indicating the probability of river acts was higher under Whig majorities in the 1690s and first decades of the 1700s but not later. One way of rationalizing this finding is that the two parties changed. In the aftermath of the Glorious Revolution they were quite different but with time they became more similar.

Stepping back from the differences between Whigs and Tories it is important to note that our results yield a clear conclusion on whether access to river navigation companies was limited or open in Britain. By our definition limited access implies that the party in power or political characteristics of constituencies affected whether they got a river navigation act. Our results show this was the case. We return to the implications of Britain being limited access later.

VI.1 Robustness

In this sub-section we examine the robustness of our findings for majority party strength. 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 7. The findings are consistent with earlier results. Also the odds ratio for 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.

Columns 2 and 4 in table 7 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 again suggesting the Whigs were more likely to employ a strategy targeting approvals to promoters in constituencies where they had recently won more seats and targeting rejections to opposition groups in constituencies where they had recently won seats.

Table 7: Probability of getting a River Act, Fixed Effects Models

Variables	Logit FE		Linear FE	
	(1) Odds Ratio Standard error	(2) Odds Ratio Standard error	(3) Coefficient Standard error	(4) Coefficient Standard error
Number majority party MPs, constituency	1.705 0.554	2.254 1.46	0.0026 0.0022	0.0017 0.003
Whig*Number ruling party MPs, constituency		0.669 0.514		0.0016 0.0049
Number majority party MPs, within 25 miles	0.762 0.094	0.823 0.122	-0.001 0.0004	-0.0004 0.0004
Whig*Number majority party MPs, within 25 miles		0.792 0.123		-0.0011 0.0004
Whig		21.467 26.83		0.0138 0.00074
Contested Election, constituency	0.717 0.333	0.685 0.343	-0.002 0.004	-0.0025 0.004
Contested Election, within 25 miles	0.995 0.136	1.02 0.153	-0.0012 0.001	-0.0013 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

Although the fixed effects models show that time-invariant unobserved constituency characteristics are not biasing our results, there is a remaining concern is that time-varying unobservable characteristics might be correlated with majority party strength. The omitted variables problem is particularly troubling if it leads to an upward bias in the coefficient estimates. To address this issue 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:

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

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

where $\#MPMPs_{it}$ is shorthand for the number of 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 7 except contested elections are omitted.

The results are reported in table 8. 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 are not reported to save space. As expected, they 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. More 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 8: Probability of getting a River Act: fixed effects regressions using 2SLS

	1	2	3
	coefficient	coefficient	coefficient
	standard	standard	standard
	error	error	error
Political variables			
Number ruling party MPs, constituency	0.008		0.0144
	0.0038		0.001
Number ruling party MPs, within 25 miles		-0.0034	-0.0041
		0.0012	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.

VI.3 Mechanisms I: Analysis of Bills and Success Rates

How can the effects of politics be explained? In order to address the mechanisms we return to the predictions of our theoretical model. It assumes that promoters were forward looking and took political characteristics into account when making their decisions about whether to introduce bills. We investigate this possibility by studying the relationship between political variables and the likelihood of a river bill being introduced in a constituency. Note that there are more constituencies with river bills than acts because not all succeeded. Table 9 shows the estimates using our baseline random effects logit model. The positive effect of Whig majorities is large as before, but the results for majority party MPs are weaker. River bills are estimated to be no more likely with more majority party MPs in the constituency. Bills are less likely with more majority party MPs within 25 miles, but the effect is smaller than for acts and not precisely estimated. Similar results are obtained in a conditional fixed effects logit model and a linear fixed effects logit model, but are not reported to save space. Thus the results provide mixed support for the idea that promoters were forward looking with the exception that they behaved as though they anticipated the effect of Whig majorities. Perhaps this finding 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.

Table 9: Probability of getting a River Bill, Baseline Model

Variables	Odds Ratio	Standard error
Number majority party MPs, constituency	0.988	0.212
Number majority party MPs, within 25 miles	0.918	0.059
Number of MPs, constituency	26.62	31.98
Number of MPs, within 25 miles	1.008	0.099
Contested Election, constituency	1.002	0.322
Contested Election, within 25 miles	0.84	0.088
Whig Majority	1.92	0.613
County constituency, constituency	0.066	0.447
County constituency, within 25 miles	1.077	0.923
Voters in Borough, constituency	1.0014	0.0008
Voters in Borough, within 25 miles	0.9999	0.0002
Density of County Voters, constituency	1.364	0.714
Density of County Voters, within 25 miles	1.1009	0.232
Market Potential, constituency	1	0.00001
Market Potential, within 25 miles	0.9999	9.67E-06
Distance to navigable network, constituency	0.951	0.0277

Distance to navigable network, within 25 miles	1.003	0.0055
Time trend	1.0287	0.013
Constituency Random effects		yes
N		3536
Wald chi2(18)		25.3
Prob > chi2		0.117

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

In light of the previous results it is possible that the effects of majority party strength worked largely through the success or failure of bills once they were introduced. Although we can estimate the effects of political variables on a bill's success, the analysis is complicated because of selection effects. Projects with differing quality could be more or less likely to get promoted under certain political conditions and thus we have a selected sample. This problem can be alleviated to some extent by studying bills from constituencies that failed and were reintroduced. Here fixed effects can be used to control for unobservable factors like project quality, although the sample size is smaller. The first set of columns in table 10 report results from a standard logit model analyzing the probability of success for the 80 constituencies that had a river bill introduced. None of the coefficients is precisely estimated, but the result still show that constituencies with greater majority party MPs had a higher probability of success and bills in constituencies with greater majority party MPs within 25 miles had a lower probability of success. The findings are similar in the fixed effects logit specification shown in the second set of columns. Overall it appears that the effects of majority party strength operated through a combination of bill selection and the approval of bills in parliament, although neither channel is dominant.

Table 10: Probability of a River Bill Succeeding

Variables	logit		fixed effects logit	
	Odds Ratio	Standard error	Odds Ratio	Standard error
Number majority party MPs, constituency	1.867	0.869	2.598	1.544
Number majority party MPs, within 25 miles	0.794	0.124	0.814	0.134
Number of MPs, constituency				
Number of MPs, within 25 miles	1.104	0.323		
Contested Election, constituency	0.453	0.292	1.036	0.932
Contested Election, within 25 miles	1.198	0.212	0.909	0.186
Whig Majority	2.452	1.694		
County constituency, constituency	3.6	20.68		
County constituency, within 25 miles	0.397	0.454		
Voters in Borough, constituency	1.0008	0.0007		
Voters in Borough, within 25 miles	0.999	0.0003		
Density of County Voters, matched constituency	1.051	0.483		
Density of County Voters, within 25 miles	1.391	0.411		
Market Potential, constituency	1.0002	0.0001		
Market Potential, within 25 miles	0.9999	2.00E-05		
Distance to navigable network, constituency	0.997	0.032		
Distance to navigable network, within 25 miles	0.998	0.008		

Time trend	1.011	0.021
Constituency Fixed effects	no	yes
N	80	43
LR chi2()	22.8	4.67
Prob > chi2	0.156	0.322

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

VI.4 Mechanisms II: Analysis of Opposition and Support for River Bills

Our main explanation for the negative effect of majority party strength within 25 miles is that party leaders targeted rejections to placate opposition groups in areas where their MPs held seats. If this is correct, then our model predicts that groups should be more willing to oppose a river bill if the majority party was strong in their vicinity. By implication groups desiring to support a river bill might be indifferent to whether the majority party was strong in their area. To test these hypotheses we analyze the probability of a constituency opposing a bill after restricting the sample to constituencies less than 50 miles from a matched constituency. In other words, for the River Avon bill of 1711 which is matched to Bath we identify all constituencies within 50 miles of Bath and include them in the sample for the 1710 to 1713 parliament. We chose this range because as shown earlier most opposition groups were within 50 miles and we don't want to include constituencies for which the river bill was mostly irrelevant. The resulting sample contains 1347 constituencies across various parliaments. We use a slightly different specification from before with variables within 10 miles of a constituency only. The spatial scale is smaller because there is more precise information on opposition locations.

The results are reported in table 11. There are several important conclusions. First, a constituency was more likely to record opposition if there were more majority party MPs within

10 miles. Second, there is no relationship between support for bills and majority party MPs. These findings are consistent with our theory that greater majority party strength in an area encouraged opposition efforts. The effect was to reduce the probability of a river bill's success.

Table 11: Probability of Having Opposition or Support to a River Bill Conditional on having a river bill introduced within 50 miles

Variables	Opposition Odds Ratio	Standard error	Support 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.

VI.4 Mechanisms III: Political Consequences of Failed Bills

Earlier we found that river acts were more likely under the Whigs than the Tories. Why was this so? One explanation is that the local electoral consequences of river bills were different under the two parties. Suppose that the typical Tory voter was a country gentleman who thought they were more likely to lose income from river navigation projects and the typical Whig voter was a merchant or large landowner who was neutral or gained income from river navigation projects. Suppose also that Tory voters rewarded the Tory candidates with more electoral support if river bills that were introduced in the Commons failed. If so then under a Tory majority local Tory MPs should have fared better in the next election when the river bill was rejected compared to the same situation for local Whig MPs under a Whig majority. We investigate this mechanism by creating a variable for the *local success of the majority party* in the next election equal to:

$$= (\#MPMP25_{it} - \#MPMP25_{it-1}) \text{ if } changemajorityparty_t = 0$$

$$= (\#MPMP25_{it-1} - \#MPMP25_{it}) \text{ if } changerulingparty_t = 1$$

where $\#MPMP25_{it}$ is the number of majority party MPs within 25 miles of constituency i in parliament t and $changemajorityparty_t$ is the indicator for parliaments when the majority party just changed in the Commons. Notice that local majority party success is positive if $\#MPMP25_{it}$ increases from parliament $t-1$ to t when there is no change in the majority party in

the Commons. When there is a change in the majority local majority party success is positive if $\#MPMP25_{it}$ decreases from parliament $t-1$ to t . With the variable *local majority party success* we can test how well the previous majority party did in the last election depending on outcomes in the previous parliament. To this end, we create a dummy variable $FailRiverbill_{it-1}$ equal to one if there was a failed river bill in constituency i in parliament $t-1$ (that is the previous Parliament) and equal to zero if the river bill succeeded and became an act.

We first test whether *local majority party success* was generally different if $FailRiverbill = 1$. Remember the sample is restricted to constituencies where there was a river bill introduced in the previous parliament as otherwise a failed river bill would be irrelevant. The first set of columns in table 12 show that *local majority party success* was generally similar as the coefficient on $FailRiverbill$ is small and insignificant. Next we test whether failed river bills had a different effect when the Whigs were in the majority in the previous parliament. The omitted case is when the Tories were in the majority in the previous parliament. The coefficients are reported in the second set of columns in table 12 and are used to construct different scenarios at the bottom. When the Whigs were the majority party their local success in the next election was fairly similar if a river bill failed. On the other hand, when the Tories were the majority party their local success in the next election was much better if the river bill failed. In other words, the Tories seemed to have gained more electoral support from rejecting river bills. This result arguably is related to the greater support for the Tory party among country gentlemen who often reported that they were opposed to river bills.

Table 12: Local Success of the Ruling Party and Failed Bills

Variables	Coefficient	Standard error	Coefficient	Standard error
River bill Fail	1.059	0.76	3.127	0.898
River bill Fail*Whig previous majority party			-2.912	1.42
Whigs previous majority party	0.268	0.671	2.094	0.953
Constant	-1.024	0.762	-2.46	0.782
N		71		71
R-Square		0.03		0.09

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

Whigs are previous majority party

Predicted local majority party success if river bill succeeds	-0.366
Predicted local majority party success if river bill fails	-0.151
Predicted success if river bill fails - Predicted success if river bill succeeds	0.215

Tory are previous majority party

Predicted local majority party success if river bill succeeds	-2.46
Predicted local majority party success if river bill fails	0.667
Predicted success if river bill fails - Predicted success if river bill succeeds	3.127

VII. Implications for Britain's Navigation Development

Our results show that 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 limit constraints 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 their representation. 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 the number of MPs nearby. 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 alternative scenario and with the actual values for majority party MPs. Next we estimate the number of river acts throughout Britain under the alternative and observed cases.²¹ 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 alternative and observed data. A high correlation would indicate that a constituencies' probability was similar in the two settings.

Table 13 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

²¹ 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 an act is very high between the observed outcomes and the alternative (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 13: Counter-factual River Development

Alternative 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
Whig Party Dominance	22	21	0.77
Tory Party Dominance	8.3	-54.3	0.74

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 bills were introduced, the project quality metric should be higher for constituencies that got river acts. A regression analysis shows that this was indeed the case. Again it would appear that the long-run consequences of limited access were not severe for Britain's navigation development.

Our estimates can also say something about what would have happened if the Whigs or Tories were the dominant party throughout. We first consider a counter-factual where the Whig party was in the majority throughout the period from 1690 to 1741. In order to make our Whig majority more plausible we further assume that Whig MPs held seats in all constituencies that were 'Whig leaning' and none elsewhere. We define a constituency as Whig-leaning if it had at least one Whig MP when the Whigs had the majority and no more than one Tory MP when the Tories had the majority in at least 11 out of the 15 parliaments. Our definition of Whig leaning is designed to give the Whigs a coalition of just over 50 percent of all seats in the Commons. The second row of Table 13 suggests that there would be an increase in the number of river navigation acts compared to the observed case. However, the correlation between the predicted probability of ever getting a river act under Whig dominance and the observed data is lower (0.77) so river acts would have occurred in somewhat different locations.

Lastly, we carry out a similar exercise investigating Tory party dominance. We assume that Tories held the majority throughout and they did so by controlling all seats in Tory leaning constituencies defined in an analogous way to give the Tories a coalition of just over 50 percent

of the seats in the Commons. The results imply a large decrease in river navigation acts and a slightly lower correlation between predicted probabilities under the observed data and the one with Tory dominance. Thus the estimates suggest that Britain's navigation development would have been far more limited if the Tories were the dominant party throughout the early 1700s.

VIII. 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. We find that river navigation acts were more likely when the Whigs were in the majority. Our evidence also suggests that the Tories discouraged river bills when they were in the majority because it increased their seats in the Commons. We also find that constituencies with greater majority party strength had a different probability of getting a river act. Our argument 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 target 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

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 that in this period political actors in Britain began to place greater weight on economic efficiency and growth when making policy decisions. MPs heard numerous arguments on behalf or against river navigation projects by local groups and experts. Many were based on sound economic arguments, not just politics. It is significant that Britain's politicians took these views into account when elites in most other countries largely ignored them.

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