

Online Appendix for “Elites and Corruption: A Theory of Endogenous Reform and a Test Using British Data” —Not Intended for Publication

Appendix A - List of Divisions

For each of the thirty divisions, the date on which it occurred, and the code in Ginter is given. The “votes for” and “against” entries are the official totals recorded from the division. The “recorded for” and “against” are the number of expressed votes which are left in the surviving lists. When the voting intention of an MP was known, but he could not express it, Ginter notes this as “absent yes/no” or “implicit yes/no”. These kinds of votes are counted in the “nonvote” category, along with “absent” votes, and they are also counted as regular yes/no votes, as they too reflect the MP’s preferences. The “balanced” entry indicates whether the division is a part of the sample for the models are denoted “balanced sample” in the text. The government vote entry is listed by Ginter as how the most important ministers voted in the division. For the bills in which an anti-corruption preference is given by a “no” vote, this fact is noted.

Whenever possible, information on the motion that the division was taken on, and its context from the Hansard is given, as this is the most accurate source for information on the debates. When this is not possible, or for additional details, the Journals of the House of Commons (JC) are another source of information. The Journals describe the business of the House in more detail but do not record the speeches given by the MPs. The description of the division from the History of Parliament is also given when available, and for one division, the description comes from the Gentlemen’s Magazine—a monthly magazine from that era.

12 Feb 1779 - Contractors Bill (779010)

Votes for: 160. Votes against: 145.

“Nonvote” for: 81. “Nonvote” against: 173.

Recorded for: 160. Recorded against: 142.

Balanced: Yes.

Government vote: No.

Description: “Division on the bill to prohibit Government contractors from sitting in the House.” (HP). The bill stated that any government contractor should not be allowed to be a member of the House of Commons, unless the contract has been awarded through competitive bidding. The mover, P.J. Clerke criticized the the government’s influence in the house given by the awarding of such contracts, and also criticized a fraudulent contract offered by the Treasury in connection to the American war effort. Lord North argued that the contract given as example had actually been awarded fairly. (Hansard)

21 Feb 1780 - Pensions Granted by the Crown (780010 1)

“No” vote is pro-reforms.

Votes for: 190. Votes against: 188.

“Nonvote” for: 35. “Nonvote” against: 29.

Recorded for: 191. Recorded against: 189.

Balanced: Yes.

Government vote: Yes.

Description: A bill was moved by George Savile on Feb 15 for an account of all pensions granted by the crown, so that the Commons could judge their usefulness. The motion was argued against by Lord North and others, who said such an account would embarrass many individuals, such as widows of aristocrats, who were paid such pensions because they had no other sources of income in spite of their high social standings. On Feb 21, Lord North moved an amendment on that bill so that it would only refer to pensions paid by the Exchequer, that is not to those paid by the Crown directly. Opponents argued this makes the bill ineffective, because its main object are the pensions that are paid secretly by the crown. A very long debate followed and the house divided on North’s amendment. (Hansard)

2 Mar 1780 - Civil Establishment Bill (780101 2)

Votes for: 197. Votes against: 232.

“Nonvote” for: 12. “Nonvote” against: 0.

Recorded for: 32. Recorded against: 53.

Balanced: Yes.

Government vote: No.

Description: A bill moved by Edmund Burke for “the better Regulation of his Majesty’s Civil Establishments and of certain public offices for the limitation of pensions and the suppression of sundry useless expensive and inconvenient places and for applying the monies saved thereby to the public service.” Speakers in favor argued that the increase in government business during the American War has increased the opportunities for corruption. Speakers against argued the bill is too general and there needs to be more time before it goes to a committee. The vote was on whether to send the bill to a committee the next day or to delay it. (Hansard)

8 Mar 1780 - Civil Establishment Bill (Third Secretary of State) (780020)

Votes for: 202. Votes against: 209.

Recorded for: 203. Recorded against: 209.

Balanced: Yes.

Government vote: No.

Description: “Division in the committee on Burke’s economical reform bill on the clause to abolish the office of secretary of state for the colonies.” (HP) This was the first clause of the Establishment Bill mentioned above. A speaker against argued that the bill both limits the executive’s constitutional right to spend money on salaries as it sees fit, as well as referring to a post which is not useless. The debate on these matters went on until 3 a.m., and then a vote was taken. (Hansard)

13 Mar 1780 - Civil Establishment Bill (Board of Trade) (780030)

Votes for: 208. Votes against: 200.

Recorded for: 210. Recorded against: 206.

Balanced: Yes.

Government vote: No.

Description: “Division in the committee on Burke’s economical reform bill on the clause to abolish the Board of Trade.” (HP) Another part of Burke’s bill. Debates similar to those presented above on abolishing this particular governmental institution. (Hansard)

28 Mar 1794 - Private Benevolences to Government (794090)

Votes for: 36. Votes against: 206.

Recorded for: 36. Recorded against: 2.

Balanced: No.

Government vote: No.

Description: A motion stating “that it is a dangerous and unconstitutional measure for the executive government to solicit money from the people as a private aid, loan, benevolence or subscription, for public purposes, without the consent of Parliament” (JC)

8 April 1794 - Reduction of Sinecures and Pensions (794100)

Votes for: 50. Votes against: 119.

“Nonvote” for: 0. “Nonvote” against: 2.

Recorded for: 51. Recorded against: 2.

Balanced: No.

Government vote: No.

Description: “a Bill for the purpose of appropriating a certain part of the emoluments arising from certain pensions and sinecure places, for the service of the public, during the continuance of the war, at the disposal of Parliament; and also for the purpose of appropriating a part of the emoluments arising from certain efficient places, amounting to more than a specified sum, to be applied to the same purpose.” (JC)

13 Mar 1797 - Reduction of Sinecures (797060)

Votes for: 79. Votes against: 171.

“Nonvote” for: 2. “Nonvote” against: 2.

Recorded for: 19. Recorded against: 4.

Balanced: No.

Government vote: No.

Description: “the extent of supplies voted to Government since the commencement of the present war, having caused so heavy an increase in taxes, it is the duty of this House to enquire whether some relief to the burdens of the people, or provision for future experience, may not be obtained by the reduction of useless places, sinecure offices, exorbitant fees in offices, and other modes of retrenchment in the expenditure of the public money.” (JC) The mover argued that in the face of increasing public debt, waste on sinecures must be curbed. William Pitt argues against the motion on the grounds that it does not make it clear how such reductions in expenditures would be achieved, and that it is all too easy to criticize the system from outside. (Hansard)

8 Apr 1805 - Censure of Lord Melville (805080)

Votes for: 219. Votes against: 218.

“Nonvote” for: 1. “Nonvote” against: 0.

Recorded for: 219. Recorded against: 216.

Balanced: Yes.

Government vote: No.

Description: Corruption charges against former War Secretary, Lord Melville: “Violation of the act of Parliament; connivance at the private profits illegally made by Mr. Trotter out of the public money; and participation in those profits” (JC). Lord Melville, (Henry Dundas), was a key member of Pitt’s cabinet and a friend of the prime minister. He was acquitted in the end, in the impeachment trial in the House of Lords, but did not return to public office. (Hansard)

15 Mar 1809 - Conduct of Duke of York (809020)

Votes for: 125. Votes against: 366.

“Nonvote” for: 3. “Nonvote” against: 1.

Recorded for: 129. Recorded against: 3.

Balanced: No.

Government vote: No.

Description: The Duke of York was the commander in chief of the British Army at the time. He was forced to step down as a result of suspicions that he allowed his mistress to sell army commissions, which they profited from. (Harling, 1996) This division is for or against the original address put forward by Gwyllym Wardle in which he reveals the corruption accusations. (Hansard)

17 Mar 1809 - Conduct of Duke of York (Perceval Motion) (809040)

“No” vote is pro-reforms.

Votes for: 280. Votes against: 198.

“Nonvote” for: 2. “Nonvote” against: 6.

Recorded for: 3. Recorded against: 201.

Balanced: No.

Government vote: Yes.

Description: The motion is an amendment to relieve the Duke of York of personal responsibility for the corrupt transactions: that the House “finds it expedient to pronounce a distinct opinion upon the truth or falsehood of these imputations; and is therefore of opinion that there is no foundation for imputing personal corruption or criminal connivance to his royal highness.” (Hansard)

17 Mar 1809 - Conduct of Duke of York (Turton Motion) (809030)

“No” vote is pro-reforms.

Votes for: 336. Votes against: 137.

“Nonvote” for: 2. “Nonvote” against: 6.

Recorded for: 2. Recorded against: 139.

Balanced: No.

Government vote: Yes.

Description: Similar to the Perceval motion above, but wants to relieve the Duke of any “knowledge” of corruption, rather than “connivance”. (Hansard)

17 Apr 1809 - Conduct of Duke of York (Committee on Abuses) (809050)

Votes for: 32. Votes against: 180.

Recorded for: 35. Recorded against: 8.

Balanced: No.

Government vote: No.

Description: This is a wide-ranging proposal to appoint a committee to inquire into all possible abuses relating to the sale of military offices: the motion is "That a Committee be appointed to enquire into the existence of any corrupt practices with regard to the disposal of Offices in any department of the state, or any agreement, negotiation, or bargain, direct or indirect, for the sale thereof; and of any corrupt practices relative to the purchase and sale of Commissions in the Army; and also, to examine into the terms on which Letters of Service have been granted for raising men for the Army by way of Levies, and the manner in which the said Levies have been conducted; and to report the same, as it shall appear to them, to the house, together with their observations thereupon; and that the said Committee have power to report the Minutes of Evidence taken before them, and their proceedings, from time to time, to the house." The prime minister replied that the

Duke of York's alleged corruption is no reason to have such a wide-ranging inquiry into the military. (Hansard)

25 Apr 1809 - Conduct of Castlereagh (809060)

Votes for: 169. Votes against: 218.

“Nonvote” for: 0. “Nonvote” against: 1.

Recorded for: 169. Recorded against: 4.

Balanced: No.

Government vote: No.

Description: A scandal involving Robert Stewart, Viscount Castlereagh, who was accused of awarding some offices in the East India Company for electoral gain as a member of the board of control. The resolution was "That it appears to this house, from the Evidence on the table, that lord viscount Castlereagh in the year 1805, he having just quitted the office of President of the Board of Controul, and being then a Privy Counsellor and Secretary of State, did place at the disposal of lord Clancarty, a member of the said Board, the nomination of a Writership to India, for the purpose of thereby procuring the said lord Clancarty a Seat in this honourable house. 2nd. That it was owing to a disagreement among other subordinate parties to the transaction, that this corrupt negotiation did not take effect.—3rd. That lord viscount Castlereagh has been by the said conduct guilty of a violation of his duty, of an abuse of his influence and authority as President of the Board of Controul, and also of an attack upon the purity and constitution of this house." (Hansard)

1 May 1809 - Dutch Commissioners (809070)

Votes for: 79. Votes against: 104.

“Nonvote” for: 0. “Nonvote” against: 1.

Recorded for: 79. Recorded against: 2.

Balanced: No.

Government vote: No.

Description: This is an inquiry into the behavior of public officials that were supposed, in 1795, to dispose of the captured Dutch ships and goods by selling them. Corruption by these officials was alleged. The motion being voted on was: “1. That it appears to this house, that to commit pecuniary trusts to any persons whatsoever, without providing any check on their proceedings, without calling for any regular or periodical accounts, and without settling, during a long course of years, the mode or amount of their remuneration, is a neglect which must inevitably lead to the most prejudicial consequences, and is a violation of the obvious duty of government. 2. That such neglect and deviation have been proved to exist, and might have been attended with material loss to the public. 3. That the Commissioners upon Dutch Property have been guilty of gross misconduct, in violating the act under which they were appointed, and appropriating to their own use without

authority, sums for which they ought to have accounted to the public. 4. That the Accounts of the Commissioners be referred to the Auditors of Public Accounts to be examined. 5. That all consideration of the remuneration to be allowed to the Commissioners ought to be deferred till their accounts are finally settled.” (Hansard)

11 May 1809 - Conduct of Perceval and Castlereagh (809090)

Votes for: 87. Votes against: 312.

“Nonvote” for: 0. “Nonvote” against: 1.

Recorded for: 87. Recorded against: 4.

Balanced: No.

Government vote: No.

Description: A motion put forward by William Maddocks that that House inquire into the conduct of Prime Minister Perceval and the Viscount Castlereagh for alleged electoral corruption. (Hansard)

17 May 1810 - Abolition and Regulation of Sinecures (810110)

Votes for: 94. Votes against: 100.

“Nonvote” for: 1. “Nonvote” against: 1.

Recorded for: 96. Recorded against: 95.

Balanced: Yes.

Government vote: No.

Description: A motion by Henry Bankes to abolish sinecure offices and replace them with a fund for the rewarding of those who served in public office for a long time. (Gentlemen’s Magazine)

7 Feb 1812 - Offices in Reversion Bill (812060)

Votes for: 56. Votes against: 58.

“Nonvote” for: 0. “Nonvote” against: 1.

Recorded for: 56. Recorded against: 57.

Balanced: Yes.

Government vote: No.

Description: Henry Bankes proposed a bill that stated “that no office, place, employment or salary, ought hereafter to be granted in reversion.” (JC) The prime minister argued that no economy would arise from such a bill, and that “the objects to be attained by it were of so little importance, that more injury might be expected to result from a discordance in the legislature, than from its adoption.” (Hansard)

4 May 1812 - Sinecure Offices Bill (812230)

Votes for: 136. Votes against: 125.

“Nonvote” for: 10. “Nonvote” against: 2.

Recorded for: 139. Recorded against: 123.

Balanced: Yes.

Government vote: No.

Description: “To take into further consideration the report on the sinecure offices bill.” (JC)

Opponents of the bill argued that it was unconstitutional in Scotland. (Hansard)

29 Mar 1813 - Sinecure Offices Bill (813050)

Votes for: 96 Votes against: 86.

Recorded for: 96. Recorded against: 2.

Balanced: No.

Government vote: Neutral.

Description: Whether to further consider the Sinecure Offices Bill. (JC)

27 May 1813 - Committee on Civil List (813100)

Votes for: 31. Votes against: 110.

Recorded for: 31. Recorded against: 2.

Balanced: No.

Government vote: No.

Description: A motion that a House Committee to inquire into the Civil List expenditures and “that the committee have power to send for persons and records” (Hansard)

14 Apr 1815 - Committee on Civil List (815140)

Votes for: 96. Votes against: 129.

“Nonvote” for: 1. “Nonvote” against: 1.

Recorded for: 97. Recorded against: 123.

Balanced: Yes.

Government vote: No.

Description: George Tierney sought to establish a committee for “inquiry into the causes of the excesses of the Civil List”. A long debate on the merits of such a committee followed. (Hansard)

8 May 1815 - Select Committee on Civil List (815230)

Votes for: 121. Votes against: 177.

“Nonvote” for: 12. “Nonvote” against: 1.

Recorded for: 121. Recorded against: 175.

Balanced: Yes.

Government vote: No.

Description: George Tierney, who had put forward other motions on the civil list, complained that all committees that had been set up do not have sufficient power to achieve anything meaningful. Now he proposes that the committee "have power to send for Mr. T. B. Mash, of the Lord Chamberlain's office." (Hansard)

6 May 1816 - Select Committee on Civil List (816200)

Votes for: 124. Votes against: 215.

Recorded for: 124. Recorded against: 215.

Balanced: Yes.

Government vote: No.

Description: Again a motion that a Select Committee on the Civil list have power to send for persons, papers, and records. (JC)

24 May 1816 - Civil List Bill (816280)

Votes for: 118. Votes against: 232.

Recorded for: 119. Recorded against: 227.

Balanced: Yes.

Government vote: No.

Description: A vote on the progress of a bill to regulate the Civil List. (JC)

14 Jun 1816 - Public Revenues Consolidation Bill (816360)

"No" vote is pro-reforms.

Votes for: 109. Votes against: 67.

"Nonvote" for: 2. "Nonvote" against: 2.

Recorded for: 108. Recorded against: 68.

Balanced: Yes.

Government vote: Yes.

Description: As a part of the Public Revenues Consolidation Bill, this is a vote on whether to allow a Vice-Treasurer position in Ireland to be created, which opponents argued was a sinecure worth £3,500 per year, as well as a deputy for that position, worth £1,000 a year. The prime minister said the position was necessary, and the only concern was the remuneration. Opponents insisted this was a sinecure, and a long debate followed. (Hansard)

17 Jun 1816 - Public Revenues Consolidation Bill (816370)

"No" vote is pro-reforms.

Votes for: 100. Votes against: 102.

“Nonvote” for: 14. “Nonvote” against: 18.

Recorded for: 101. Recorded against: 102.

Balanced: Yes.

Government vote: Yes.

Description: This is a vote specifically on the salary of the office in Ireland to be created. The vote is on whether the salary to be £3,500 a year, which opponents argued was excessive. (Hansard)

20 Jun 1816 - Public Revenues Consolidation Bill (816380)

Votes for: 113. Votes against: 151.

“Nonvote” for: 16. “Nonvote” against: 15.

Recorded for: 103. Recorded against: 150.

Balanced: Yes.

Government vote: No.

Description: This is an amendment proposed by Henry Bankes, to make the deputy of the newly-created Vice-Treasurer of Ireland not receive money directly from the budget, but rather that his salary be deducted from the salary of the Vice-Treasurer. (Hansard)

17 Feb 1817 - Salaries of Secretaries of Admiralty (817040)

Votes for: 116. Votes against: 171.

Recorded for: 116. Recorded against: 172.

Balanced: Yes.

Government vote: No.

Description: Charles Wentworth-Fitzwilliam, Lord Milton, proposed a motion "That the issue of the war salaries to the secretaries to the admiralty, and certain other persons connected with the navy and dock-yards, in consideration of the expedition to Algiers, which terminated in hostilities with that government, is uncalled for by the order in council of January 15th, 1800, and therefore an improper application of the public money." The issue was that the secretaries of the Admiralty had a higher salary in time of war, and they had claimed that higher salary during a Navy expedition to Algiers in a manner which opponents said was not legal. (Hansard)

25 Feb 1817 - Reduction in the Number of Lords of the Admiralty (817070)

Votes for: 154. Votes against: 210.

“Nonvote” for: 1. “Nonvote” against: 0.

Recorded for: 152. Recorded against: 207.

Balanced: Yes.

Government vote: No.

Description: Matthew Ridley puts forward a motion that the number of officials in the Board of Admiralty be reduced from its current six. He argued this number was too high for a time of peace. (Hansard)

19 May 1817 - Civil Services Compensation Bill (817220)

Votes for: 107. Votes against: 47.

Recorded for: 2. Recorded against: 47.

Balanced: No.

Government vote: Yes.

Description: A vote on the progress of the Civil Services Compensation Bill, which instituted pensions for public officials, as a substitute for the practice of granting sinecures for elderly government workers. Reformers such as Henry Bankes spoke in favor of the bill. (Hansard)

10 Jun 1817 - Civil Services Compensation Bill (817260)

Votes for: 29. Votes against: 66.

Recorded for: 29. Recorded against: 2.

Balanced: No.

Government vote: No.

Description: A vote on a clause in the Civil Services Compensation Bill that anyone receiving a pension under the provisions of the law cannot be a member of Parliament at the same time. (Hansard)

10 Jun 1817 - Civil Services Compensation Bill (817270)

Votes for: 77. Votes against: 22.

Recorded for: 2. Recorded against: 22.

Balanced: No.

Government vote: Yes.

Description: A vote on whether to continue taking into consideration the Civil Services Compensation Bill. (Hansard)

18 Mar 1819 - Reduction of Admiralty Board (Two Lay Lords) (819080)

Votes for: 166. Votes against: 247.

“Nonvote” for: 2. “Nonvote” against: 1.

Recorded for: 167. Recorded against: 3.

Balanced: No.

Government vote: No.

Description: Matthew Ridley proposes a reduction in the number of the Lords of the Admiralty as he had done in 1817. (Hansard)

29 Mar 1819 - Electoral Bribery by Windham Quinn (819100 1)

Votes for: 75. Votes against: 164.

Recorded for: 75. Recorded against: 158.

Balanced: Yes.

Government vote: Neutral.

Description: An MP, Windham Quinn, was accused of bribing an influential individual in his constituency, by offering him the position of justice of the peace. The vote is on whether to take the matter into further consideration. (Hansard)

17 May 1819 - Barnstaple Bribery Bill (819220)

Votes for: 112. Votes against: 14.

Recorded for: 2. Recorded against: 14.

Balanced: No.

Government vote: Neutral.

Description: Sir Manassah Lopez was imprisoned for his open bribery at Barnstaple, and this bill was on whether to change to franchise in that constituency so that it would not be concentrated among a few venal electors, but rather be extended to 800 freemen. The bill was defeated in the Lords in the end, in spite of strong support in the Commons. (Hansard)

22 Jun 1819 - Penryn Bribery Bill (819360)

Votes for: 46. Votes against: 26.

Recorded for: 46. Recorded against: 25.

Balanced: Yes.

Government vote: Neutral.

Description: A vote to proceed considering the Penryn Bribery Bill, which aimed to remove the franchise from the venal borough of Penryn, where corruption had been proven. (Hansard)

Appendix B - Data

Data collection

The sources for the independent variables are the History of Parliament and Judd (1972). Each MP for whom there is a vote recorded in the 30 bills which are analyzed is assigned a unique code in Ginter (1995). This code is also used by Judd. Lists from Judd were also used for the variables *merchant*, *India* (where the categories “East India interest” and “Nabobs” from Judd are conflated), *banker* (split into those associated with the Bank of England and others), *manufacturer*, and *physician*.

For the other independent variables, the source is the History of Parliament. We processed a digital version of the relevant volumes (1754-1790 and 1790-1820) from the HP to allow the extraction of the relevant information using the Python programming language. The text was put in ASCII format, therefore stripping much of the formatting. From each volume only the parts which contained biographies of MPs are kept, removing the introductory chapters and the parts where the individual constituencies are presented.

We then used the Natural Language Toolkit (NLTK) (Loper and Bird, 2002) package in Python to split the raw string into “tokens”, that is units of analysis for the algorithms to be applied on the text. The first relevant level of tokenization for this analysis is the word. We used the function `word_tokenizer` from NLTK to split the text at this first level. This function applies the Treebank Word Tokenizer algorithm to the text (Marcus et al., 1993), which ensures that words are defined in a natural manner.

The second level of aggregation of the data is the MP level. To establish the beginning of the entry for an MP, we search for the word patterns which are characteristic of this: one or more last names written in all capital letters (possibly with apostrophes, as for “A’Court”), of length at least three characters, and followed shortly by a comma (to separate them from the first name). We removed the few words which might have produced this pattern but were not last names, such as “USA”, by inspecting every last name produced by this criterion. The entry for an MP, as can be seen in the example in the second part of this appendix, is split in two: a “header” which gives the basic biographical information in a pre-set order, and a body which presents less structured information.

A very large number of MPs were known by more than one name throughout their lives. Changes of last name were common, when one acceded to an aristocratic title, or when one individual inherited a fortune from someone other than his father. In the latter case, the last name of the person whose wealth was being inherited was often added to the last name of the heir. Other sources of multiple names are different spellings of Huguenot names, and multiple spellings of regular English names. When this is the case, the HP uses the official name of the MP when he first got elected, and for the other names it has entries of the form “New Name, see Old Name”.

Such entries have been removed from the text, as they add no information.

Also removed are any “c.” (*circa*) or “bef.” (before) words before years to leave year entries as simply four (or two) figures.

Some MPs have more than one entry because they had a significant political role both in the 1754-1790 and in the 1790-1820 periods. When this is the case, the two texts are joined, based on the criterion of identical names and dates of birth and death.

Each entry for an MP is tagged with the code used by Ginter and Judd. When a name matched exactly and uniquely the one in Judd’s book, we assigned that code to the entry for that MP. When there was no perfect match, or multiple matches, we assigned the code manually, going by the dates of birth and death as a criterion for identifying which MP should be matched with what code.

Once this basic processing of the text had taken place, we used simple algorithms for extracting information from each MP’s entry. The variables used in the paper, which are not code from Judd, have been extracted as follows:

Lawyer. The criterion for extracting the list of lawyers is that the MP should be either “called to the Bar” or mentioned in the text as a solicitor or advocate (for a small number of cases) and that he should not be established by Ginter as exercising another profession. We settled on this criterion because the number of lawyers obtained in this case (about 11% of the House) matches the estimates made by the authors of the HP. Using just legal education produces too many positive results, as a degree in law was very usual for those with university education. Looking at just those mentioned in the body as lawyers produces too few positive results, when compared to the HP.

The pattern (regular expression) we looked for in the header of the text (using “1780” as a placeholder for any year) was of the form “called 1780” or “called to the English Bar 1780”, or “called [I] 1780” (for Ireland), or “Solicitor in”, or “adv.”, or “articled”. All these expressions allow for different capitalization. From the list of MPs obtained using this criterion, we eliminated those identified explicitly by Judd as ending up in other professions, as an early career in law was often a natural stepping stone towards business and trade.

Military. We try to only capture career military men rather than everyone who did some military service in their youth. Those who ended up as Colonels or Rear-Admirals or higher, can safely be considered career military men. We search for the patterns indicating such positions for every MP (“col.”, “gen.”, “r-adm.”, “f.m.”, etc.).

Government official. To get at official positions for an MP, we first removed the part of the text which referred to his parents. This is because entries often contain in their header information of the form “s. of John Doe, Secretary of the Navy 1750-1755”, sometimes with other pieces of information about the parents. Also included is sometimes information about the MP’s wife’s parents (“m. to Jane Doe, da. of John Smith, Master of the Mint 1740-1750”, etc.) We removed the parts of the text that begin with “s. of” and until a pattern that indicates the MP’s own children, of the form (“x s., y d.” or “s.p.” for *sine prole*). This ensures that whatever information is extracted

refers to the MP, not to his parents or to his wife's parents. The HP presents a list of all official positions held by the MP, along with their date of beginning and end, as the last entry of the header. We used a combination of automated extraction and manual checking to get at the "government official" variable. We first recorded any pattern that indicates a date range in the last portion of the header, along with the text right before it, which should be the name of the position. Then we manually checked the resulting entries, to ensure they really refer to positions the MP has held. While in general the HP lists only political/administrative positions, sometimes private-sector or non-profit positions are also listed. We eliminate any such position, for example those relating to various clubs for agricultural improvement, or other non-profits. We also eliminate local-level positions, often symbolic, such as sheriff, because these often came about as a natural consequence of the influence of the MP in the community. We do however keep the position of governor or lord-lieutenant of an administrative division, as these individuals were the monarch's representatives in that division. We then check whether in the 14 years in which votes occur any such position is recorded for each MP.

Public School. Namier and Judd emphasize the role of public school education for forming a common class spirit among the oligarchy. Judd lists the public schools that MPs could attend: Charterhouse, Eton, Harrow, Rugby, Shrewsbury, Westminster, and Winchester. We record whether these names occur after the "educ." marker.

University. Similarly, we record whether the words Oxf., Camb., Aberdeen, Edinburgh, Glasgow, Andrews, Dublin, Leyden or simply Univ. occur after the "educ." marker. Overwhelmingly, the MPs who went to university did so at Oxford and Cambridge.

Grand Tour. We record whether "Grand Tour" is encountered in the header for the MP.

First son. Being a first or younger son was crucial in the social structure of the times. Strict primogeniture rights awarded the estate of the father to the first son only, with no possibility of splitting it. Aristocratic titles as well were passed on only to first sons. Younger sons mainly had to provide for themselves. Typical career paths for younger sons of the oligarchy were the military, government, the colonies, law, or business. We search for patterns like "1st s. of" or "o.s. of" or "1st surv. s. of" in the header of the entry.

Aristocrat. MPs could accede to an aristocratic title either by inheriting it from someone or by having it be granted by the executive to them. We search for "Duke", "Mq.", "Marquess", "Earl", "Visct.", "Viscount", "Baron", "Bt." or "suc. fa. as" (for "succeeded father as"), or "cr." for "created" in the header of the text.

Whig Club / Brooks' Club. We search for a mention of the names of the clubs in the entire text of the entry. Members that did join one of these clubs always have an entry of the form "He joined the Whig Club in...".

For the constituency-level data, we first needed to extract the name of the constituency that the MP served in in each one of the 14 years in which votes occurred. We did this by searching for

the specific patterns that identify the constituency names in the header of the entry for each MP. The constituencies are written in capital letters and followed immediately by the years between which the MP served there. For each MP we recorded the name of the constituency and the years associated with it. Then we recorded the name of the constituency for each of the relevant years (e.g. 1779, 1780, etc).

The information for each constituency in these years is taken from the parts of the HP which deal with the districts. Both the 1754-1790 and the 1790-1820 volumes present tables of the constituencies, with their size (small, medium or large), franchise type, and whether there were contested elections in official election years, or in by-elections. We matched these pieces of information to each constituency-year. The size and franchise type do not change over the years. The contested election variable is coded as yes if a contested election is recorded at the last general election or the last by-election before or during the year the vote is recorded.

The dependent variable is coded from the records provided by Ginter. The votes in which the MP is listed as “absent yes” or “implicit yes”, and “no” respectively, are coded as “yes” or “no”, as they too reveal the MPs’ preference. These votes are matched with the records for the independent variables using the unique code which characterizes each entry. At the end of this process, each expressed vote has been matched with an entry from the HP and Judd, and therefore with the needed independent variables.

Sample entry from the History of Parliament (first paragraphs only)

ABERCROMBY, Hon. James (1776-1858), of Spring Gardens, Westminster.

MIDHURST 1807-1812
CALNE 1812-1830
EDINBURGH 1832-May 1839

b. 7 Nov. 1776, 3rd s. of Gen. Sir Ralph Abercromby, and bro. of Hons. Alexander Abercromby, George Abercromby and Sir John Abercromby. *educ.* Edinburgh h.s. 1788-91; Christ Church, Oxf. 1794; L. Inn 1794, called 1800. *m.* 14 June 1802, Mary Anne, da. of Egerton Leigh of High Leigh, Cheshire, 1s. *cr.* Baron Dunfermline 7 June 1839.

Commr. of bankrupts 1801-27; PC 23 May 1827; judge adv.-gen. 1827-8; chief baron of Exchequer [S] 1830-2; master of Mint (with seat in cabinet) July-Dec. 1834.

ol. London and Westminster light horse 1798-1800.

Speaker of House of Commons 1835-9.

Abercromby wrote of himself in 1820: 'As to my own fortune it is that of a younger brother and consists mainly in the fruits of my own industry'. He had the asset of being 'singularly intelligent'. A contemporary of Francis Horner and Henry Brougham at Edinburgh high school, he completed his education in England. Soon after his call to the bar he was admired for 'his spirit and independence' at a legal club at the *Crown and Anchor* tavern in London. He practised in Chancery, becoming, through his father's friendship with Lord Loughborough, a commissioner of bankrupts. He was probably the 'Mr Abercromby' suggested to Lord Grenville by Lord Henry Petty in May 1806 as fit to be a commissioner of accounts. He broke with his family's politics by joining the Whig Club on 5 May 1807 and four days later was returned to Parliament, by his sister-in-law's brother-in-law Lord Carrington, for Midhurst. He went on to join Brooks's Club on 26 Apr. 1808. Thus in his first Parliament he was a committed member of the Whig opposition. Sir Samuel Romilly wrote of him, 15 June 1808:

I have the highest opinion of Abercromby and I think him likely to render most essential service to the country. He has a very enlightened mind, an excellent understanding, very just principles of political economy, an independent spirit and a warm love of liberty and he has the more merit, because all his connexions are Tories. If I do not mistake, his brother married a daughter of Lord Melville. 1

Abercromby first spoke against the Irish insurrection bill, 24 July 1807. On 15 Feb. 1808 his motion for particulars of the negotiation with Portugal in 1806 was objected to in part by Canning, who carried his point by 142 votes to 82. Abercromby voted for Whitbread's peace resolution, 29 Feb., and deplored the Copenhagen expedition, 21 Mar. He invariably supported Irish Catholic relief. He opposed the Scottish judges' pensions, 4 May, particularly their award to barons of the Exchequer, 2 June 1808, and objected to the copyright bill, 17, 22 June. The first subject that appealed to him, however, was the problem of penal reform; in this he was a coadjutor of Romilly. On 15 June 1808 he expressed his hostility to transportation to Botany Bay for limited periods and promised to move for inquiry next session: in fact he postponed it again, 26 May 1809, on the understanding that ministers were reviewing the situation. On 18 Jan. 1809 he was one of the Whigs meeting to endorse Ponsonby's leadership. He was an interrogator in the Duke of York's case and voted against Perceval on 17 Mar. In the debate on the Bankruptcy Laws he suggested from his own experience that the bankruptcy commissioners should be given sufficient remuneration to spare them from other legal pursuits, 29 Mar. On 27 Apr. he failed in a bid to secure

III-1790-12

information for the purpose of clearing the name of Sir John Moore, by 62 to 37. He voted for Hamilton's motion on ministerial corruption on 25 Apr., but not for Madocks's on 11 May; he explained this, 12 June, by reference to his hopes of the House 'purging itself' through Curwen's reform bill. He opposed that bill as amended, but did not vote for Burdett's reform motion on 15 June. He took an interest in the Scottish judicature bill and complained of the delay in implementing it, 13 June. Later that year Creevey, a more rebellious Whig who found him unwilling to talk politics with him, reported Abercromby as prophesying that 'the present reign will end quietly from the popularity of the King, but that when it ends the profligacy and unpopularity of all the Princes, with the situation of the country as to financial difficulties, and the rapidly and widely extended growth of Methodism will produce a storm'. 2

Abercromby was commended by Lord Henry Petty to Lord Holland, 4 Oct. 1809, as being 'admirably fitted for any of the secondary departments, and to be relied upon in every sense', if opposition took office. He assisted Lord Grenville in his canvass to become chancellor of Oxford University. He was one of the young Whigs eager for a coalition with Canning, whose conduct he did not wish to see indicted in the *Edinburgh Review*. Despite reports to the contrary, he favoured a continuation of Ponsonby's leadership. 3 In December Tierney ('Old

Summary statistics

Variable	Full sample		Balanced sample			
	Obs.	Mean	S.d.	Obs.	Mean	S.d.
Dependent var.						
Yes Vote	7141	0.536	0.499	5776	0.449	0.497
Occupational cat.						
Merchant	7141	0.058	0.233	5776	0.051	0.220
Physician	7141	0.004	0.067	5776	0.003	0.059
Manufacturer	7141	0.008	0.091	5776	0.009	0.094
Military	7141	0.321	0.467	5776	0.321	0.467
Government Official	7141	0.222	0.415	5776	0.249	0.433
Bank of England	7141	0.006	0.078	5776	0.006	0.078
Banker	7141	0.051	0.220	5776	0.047	0.212
India Bourgeoisie	7141	0.071	0.258	5776	0.071	0.257
W. Indies Bourgeoisie	7141	0.043	0.204	5776	0.046	0.209
Landowner-only	7141	0.314	0.464	5776	0.311	0.463
Lawyer	7141	0.071	0.256	5776	0.067	0.250
Group A	7141	0.456	0.498	5776	0.471	0.499
Group B	7141	0.110	0.313	5776	0.112	0.315
Group C	7141	0.550	0.498	5776	0.534	0.499
Bourgeoisie	7141	0.330	0.470	5776	0.321	0.467
Personal char.						
Public School	7141	0.448	0.497	5776	0.442	0.497
University	7141	0.565	0.496	5776	0.566	0.496
Grand Tour	7141	0.045	0.207	5776	0.046	0.209
First Son	6977	0.490	0.500	5640	0.486	0.500
Aristocrat	7141	0.343	0.475	5776	0.348	0.476
Whig Club	7141	0.120	0.325	5776	0.094	0.292
Brooks' Club	7141	0.215	0.411	5776	0.170	0.376
Constituency size						
Large const.	7141	0.338	0.473	5776	0.324	0.468
Medium const.	7141	0.115	0.319	5776	0.110	0.313
Small const.	7141	0.517	0.500	5776	0.533	0.499
Unknown size const.	7141	0.030	0.172	5776	0.032	0.176
Franchise type						
County	7141	0.240	0.427	5776	0.241	0.428
Burgage Franchise	7141	0.096	0.294	5776	0.101	0.301
Scottish Borough	7141	0.018	0.133	5776	0.019	0.137
Corporation Borough	7141	0.091	0.288	5776	0.092	0.289
Freeholder Franchise	7141	0.027	0.162	5776	0.027	0.163
Freeman Borough	7141	0.356	0.479	5776	0.350	0.477
Householder Franchise	7141	0.045	0.208	5776	0.044	0.206
Other (Univ.) Franchise	7141	0.012	0.110	5776	0.013	0.112
Scot-and-Lot Franchise	7141	0.114	0.317	5776	0.113	0.316
Election						
Contested Election	7141	0.299	0.546	5776	0.290	0.453

Appendix C - Additional results

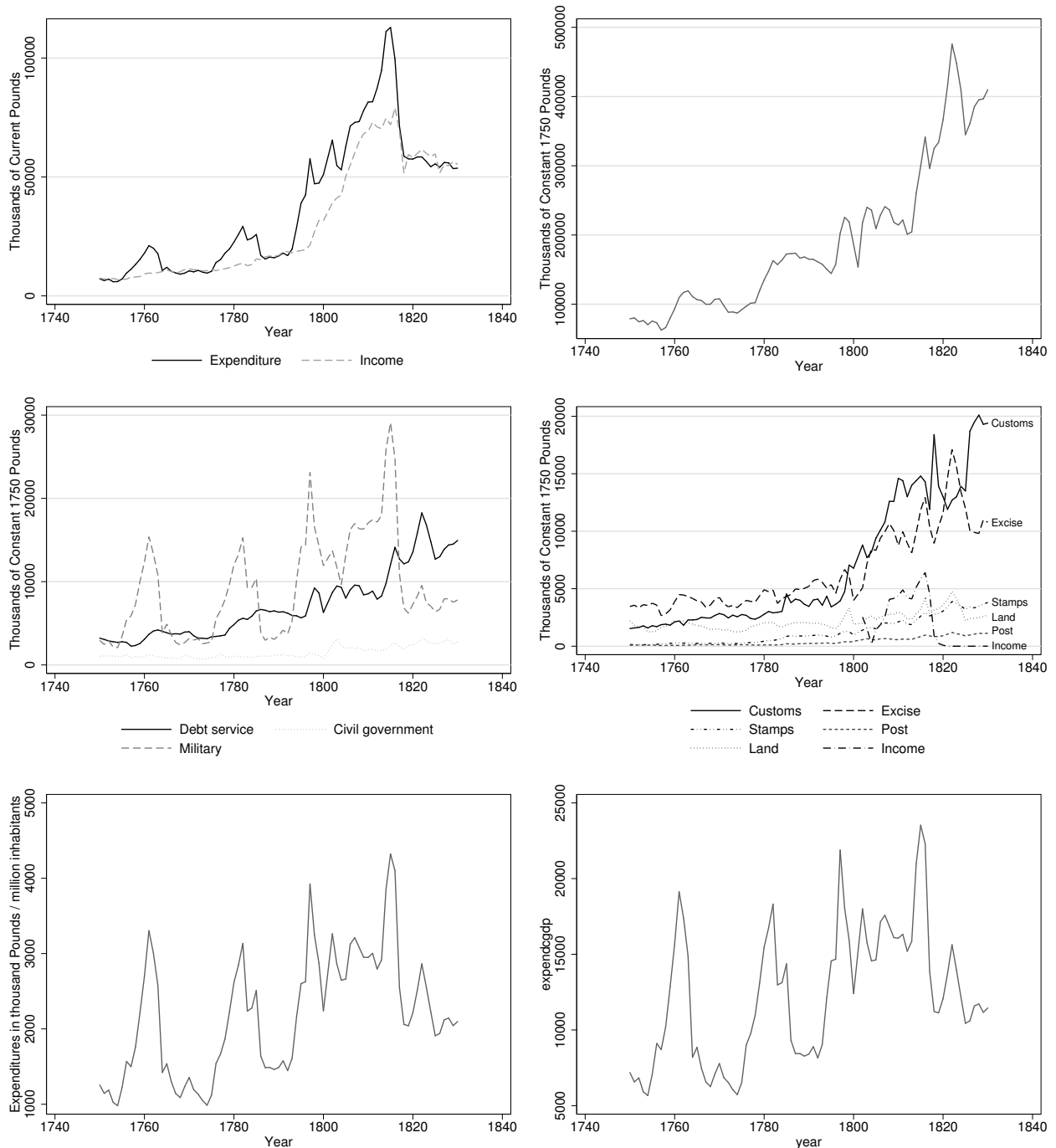


Figure 1: *Upper-left:* Government income and expenditure, nominal pounds. *Upper-right:* Public debt, ct. Pounds. *Middle-left:* Types of expenditure, ct. Pounds. *Middle-right:* Sources of income, ct. Pounds. *Lower-left:* Expenditures in ct. Pounds per million inhabitants. *Lower-right:* Expenditures in ct. Pounds correcting for GDP growth (expenditures are deflated by a measure of GDP starting with a base of 1 in 1750). Data from Mitchell (1988) for expenditures and population. Data from Broadberry et al. (2010) for growth rates .

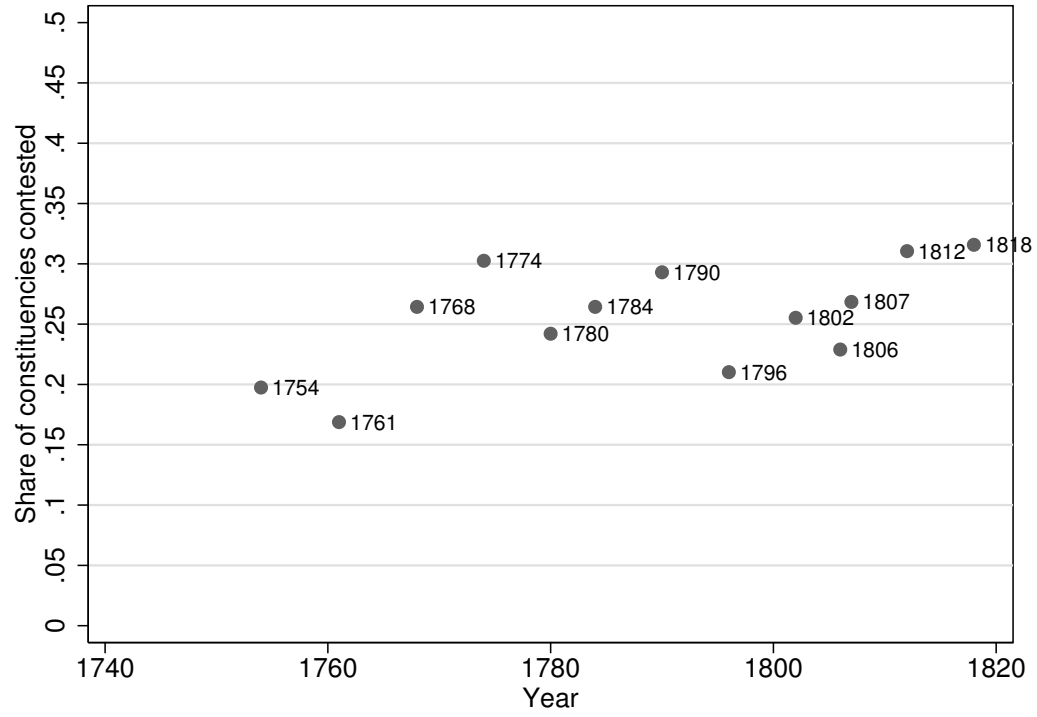


Figure 2: Share of electoral districts contested at each election. Data from the History of Parliament.

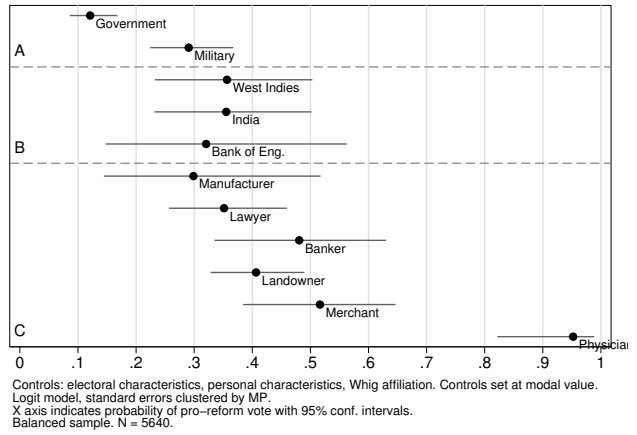
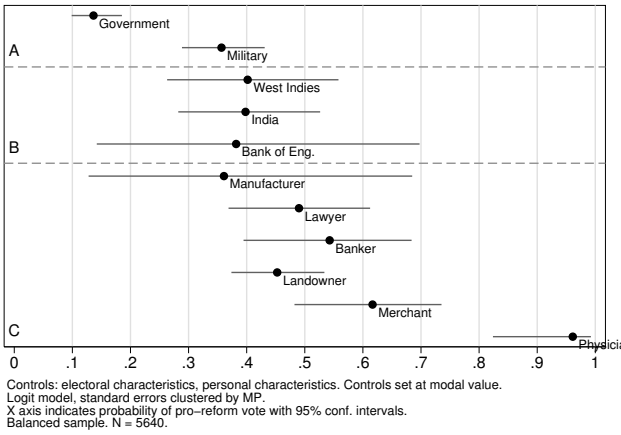
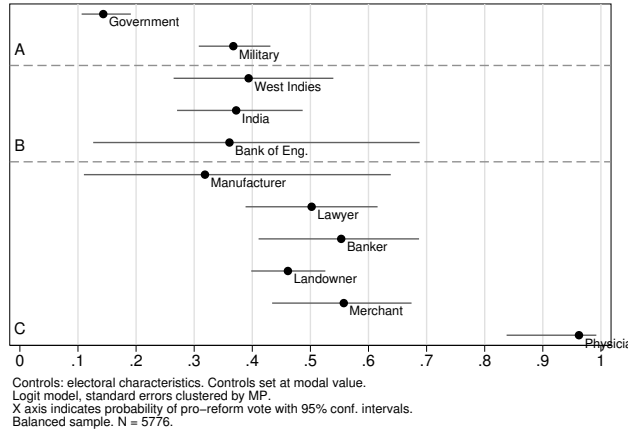
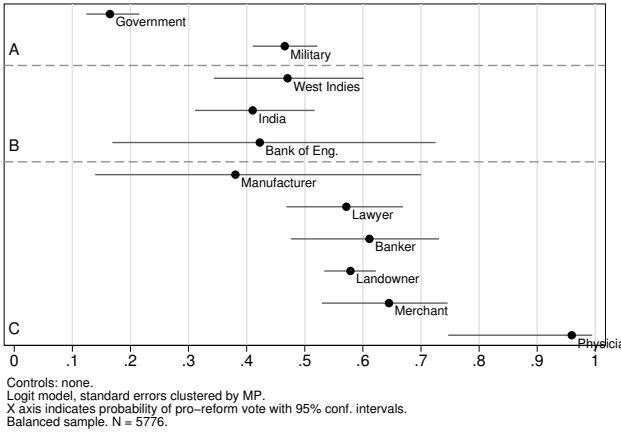
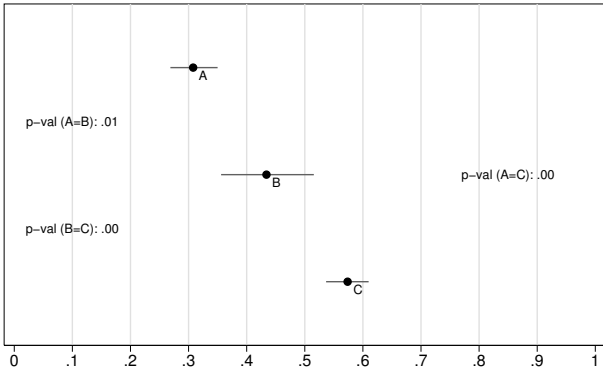
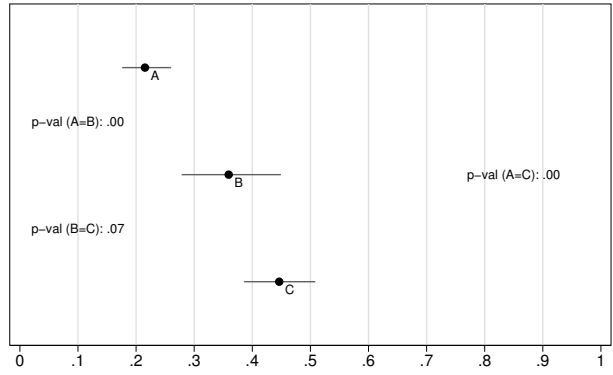


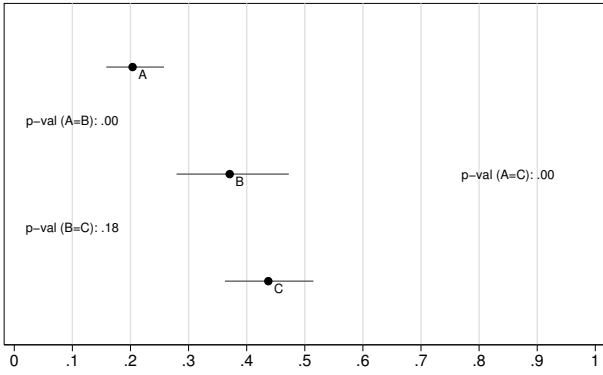
Figure 3: Upper-left: Voting behavior by occupational group, no controls. Upper-right: Voting behavior by occupational group, controls for electoral characteristics. Lower-left: Voting behavior by occupational group, controls for electoral and personal characteristics. Lower-right: Voting behavior by occupational group, controls for electoral characteristics, personal characteristics, and Whig affiliation.



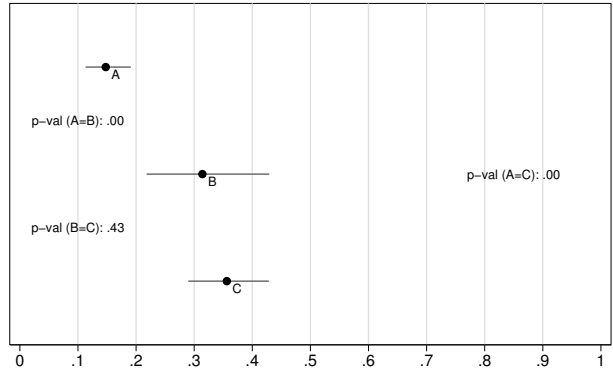
Controls: none.
 Logit model, standard errors clustered by MP.
 X axis indicates probability of pro-reform vote with 95% conf. intervals.
 Balanced sample. N = 5776.



Controls: electoral characteristics. Controls set at modal value.
 Logit model, standard errors clustered by MP.
 X axis indicates probability of pro-reform vote with 95% conf. intervals.
 Balanced sample. N = 5776.



Controls: electoral characteristics, personal characteristics. Controls set at modal value.
 Logit model, standard errors clustered by MP.
 X axis indicates probability of pro-reform vote with 95% conf. intervals.
 Balanced sample. N = 5640.



Controls: electoral characteristics, personal characteristics, Whig affiliation. Controls set at modal value.
 Logit model, standard errors clustered by MP.
 X axis indicates probability of pro-reform vote with 95% conf. intervals.
 Balanced sample. N = 5640.

Figure 4: Results on balanced samples. *Upper-left:* Voting behavior of groups A, B, and C, no controls. Voting behavior of groups A, B, and C, controls for electoral characteristics. Voting behavior of groups A, B, and C, controls for electoral and personal characteristics. Voting behavior of groups A, B, and C, controls for electoral characteristics, personal characteristics, and Whig affiliation.

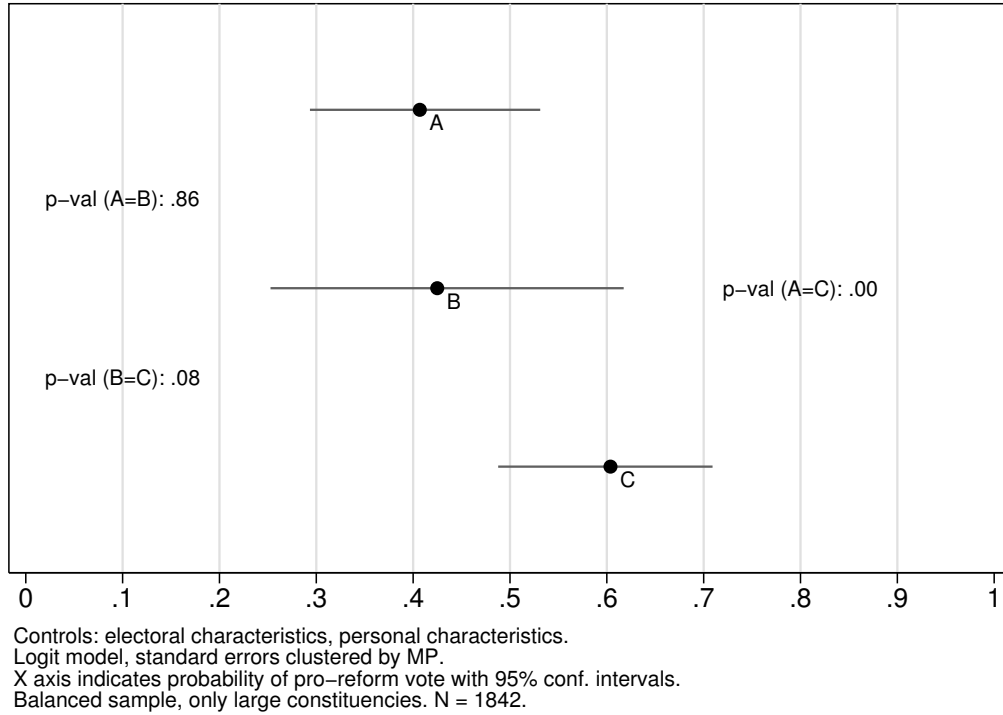


Figure 5: Voting behavior of groups A, B, and C, controls for electoral characteristics and personal characteristics. Only large constituencies.

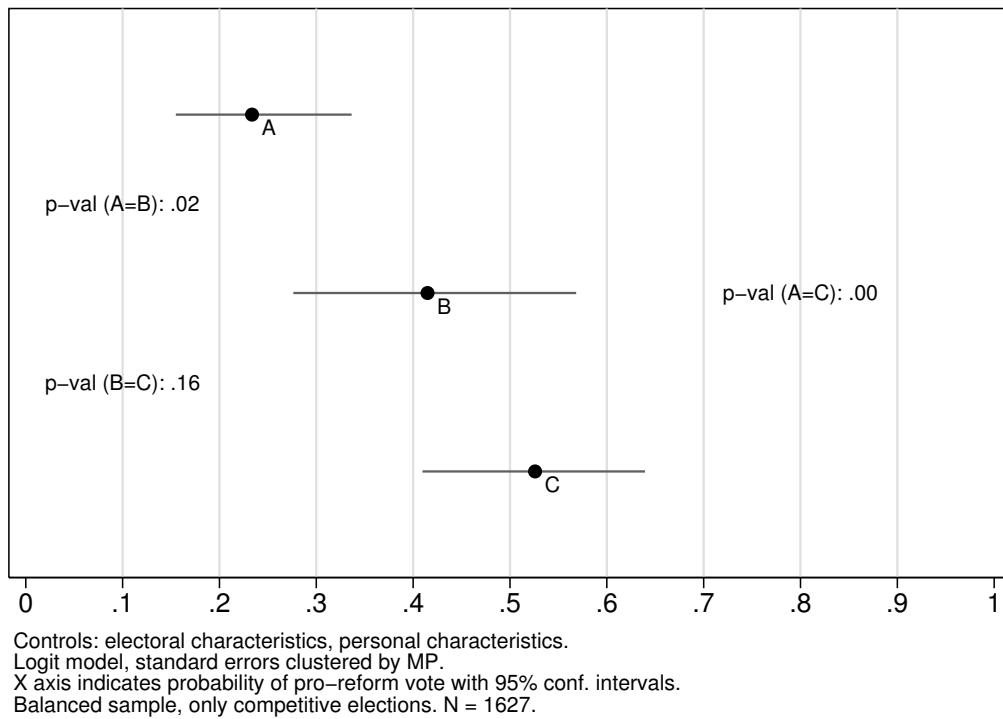


Figure 6: Voting behavior of groups A, B, and C, controls for electoral characteristics and personal characteristics. Only competitive elections.



Figure 7: *Left*: nominal interest rates on government debt. *Right*: Share price index. Data from Mitchell (1988).

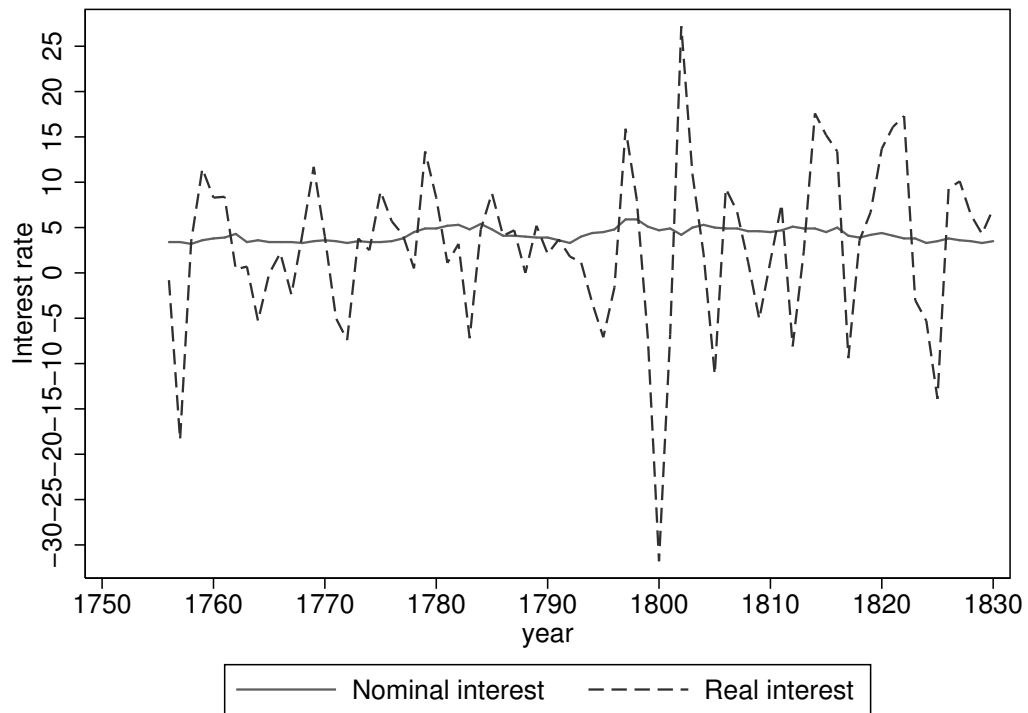


Figure 8: Real interest rate computed as nominal interest rate on long-term debt minus rate of inflation. Data from Mitchell (1988) and Officer [2011]

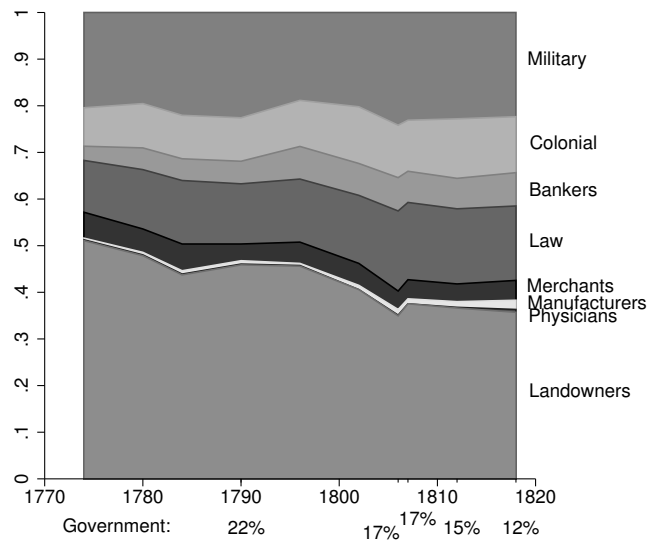


Figure 9: Share of eight professional categories in the House. Source: Judd (1972). The share of government workers computed from figures provided in Thorne (1986). The independent part of the House, defined as explained in the body, formed a large majority of 65%-70% throughout the period under analysis. Judd does not include MPs who were government officials or employees as a separate category. The History of Parliament (Thorne, 1986) however, calculates the share of the House which could be considered as being made up of government officials (including ministers), sinecurists, and court employees at various points: in 1790 this was 22%, in 1806 and 1807, it was 17%, in 1812 it was 15%, and in 1818 it was 12%. Even allowing that a disproportionately large share of these officials came from the six “independent” categories above, this still leaves a majority of the House belonging to the independent group.

Appendix D - Formal treatment of the model

The informal logic presented in the body of the paper can be analyzed through a model of repeated interaction between players making up an elite: The members of the elite are either government officials, labeled group O , of size n_O , or economic elites labeled group E , of some large size n_E . (Individual players will be indexed by the corresponding lowercase letters o and e .) The two groups are represented in a legislature by subsets of their members. The government officials in the legislature are labeled group A , of size n_A . Economic elites in the legislature are subdivided in two groups, depending on their relation to the government officials: “Dependent” E players whose incomes depend on the actions of government players are labeled group B , of size n_B , and E players whose incomes do not depend on the actions of government officials are labeled group C , of size n_C . Note that the same players would be referred to as being part of groups A, B , or C when discussing their voting behavior in the legislature, and as part of groups E and O when discussing their other actions. The situation which is most relevant for the case at hand is one in which members of group C form a majority in the legislature.

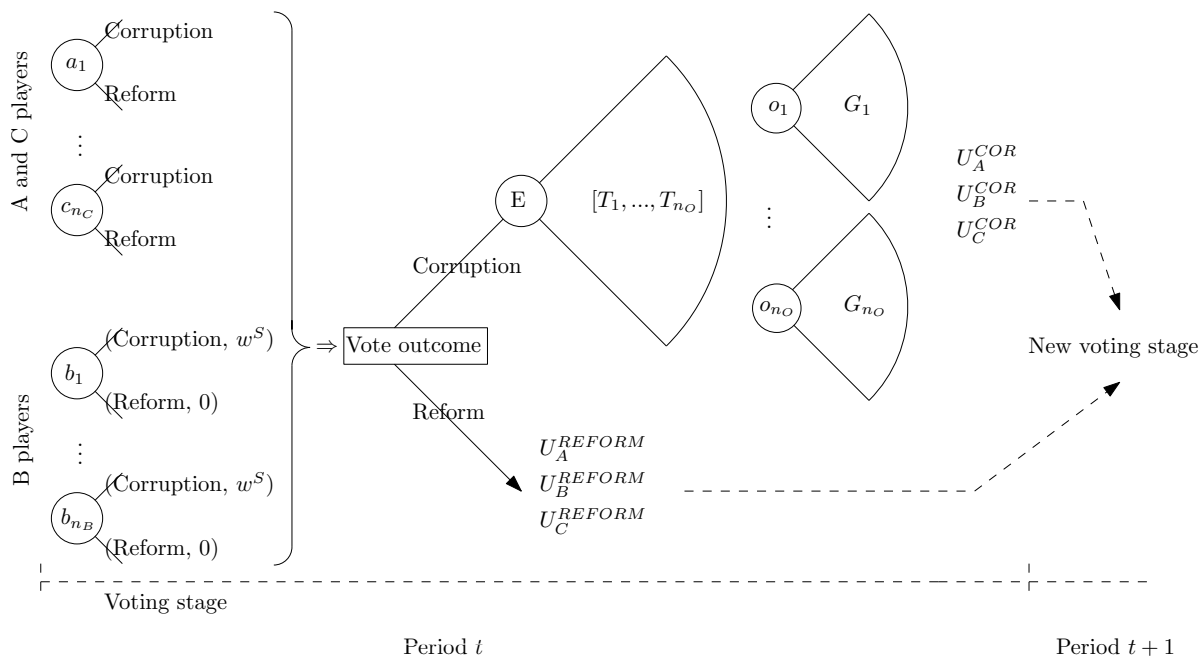


Figure 10: Illustration of the stages of the repeated game

The interaction between the players takes the form of an infinitely repeated game, in which each period they make decisions regarding the allocation of endowments, the production of government goods, and the status of corruption versus reform. This modeling approach is most closely connected with that in Acemoglu (2003). As in that paper, interactions between citizens and government agents are subject to a commitment problem, with cooperation arising as a result of repeated interaction. The game is illustrated in Figure 10. One period of the repeated game is made

up of one interaction between the agents, in which they get to make decisions regarding the allocation of funds generated in the economy, the production of governmental goods, and the extraction of rents. In the first stage of the period, legislators decide between interacting in a corrupt or reformed system for that period, by taking a majority vote on a binary agenda containing the two options. The standard assumption that the players do not use weakly dominated strategies in the voting equilibrium is made here. In case corruption is the outcome of this vote, in the next stages resources are committed for the production of the government good and its production takes place. In the second stage of the period, under corruption, economic elites make an allocative decision: they each have an endowment which they can use for private consumption or production of government goods. The government goods have to be produced by government officials in group O . Government goods can be produced from the tax income that economic elites hand out to government officials.¹ The total tax payment made by economic elites, T^T , is equally shared among them, so $T = \frac{T^T}{n_E}$ is the per-capita tax payment, and then is distributed to the government officials as the vector $[T_{o1}, \dots, T_{on_o}]$, where $\sum_{o=1}^{o=n_o} T_o = T^T$.² (The assumption that economic elites pay the tax for the production of the good, rather than managing to push it to the less politically powerful citizenry is justified by the fact that the legal incidence of taxation bears little importance for its true economic incidence. Most taxes in Britain were consumption, trade, and land taxes (Figure 1, Appendix C), the costs of which are borne by both producers and consumers, regardless of how they are collected.)

In stage three, each government official receives the share of the tax payment T_o , and decides how much of it to use for the production of G_o and how much to keep as their own rents R_o . The cost of producing one unit of G is 1 in terms of the numeraire. Each government official will produce a certain level G_o of government goods, and will keep the rest of the tax payment as a rent: $R_o = T_o - G_o$. The total amount of public goods produced is therefore $\sum_{o=1}^{o=n_o} G_o = G$.

After this, players receive their payoffs. All players have generic quasilinear utilities for private and public consumption. The utility function of E players is:

$$U_e = P_e + \alpha u(G) \tag{1}$$

¹The assumption that economic elites act cooperatively in paying the tax, and therefore that each E player is bound to pay the tax that emerges from the group's optimality conditions is made here. This would correspond to a situation in which economic elites get to vote on the optimal contribution that each has to make, rather than making that contribution voluntarily, arguably a good description of the situation in Britain.

²The body of the paper focuses on the case in which G is a public good, produced jointly by a large number of government officials, arguably the best model of government activities. A few other cases will be discussed in the footnotes, and their conclusions are similar: the case when the good is a private good produced by a single official (in the sense of one official accepting payment for it), and the less likely cases of G being a private good produced by a large number of officials, and of G being a public good produced by one official.

The parameter α here serves to indicate changes in the relative utility of the public good, which are of interest for the theory—an increase in α means that the public good is more valuable relative to the private good, a situation which is applicable in general to modernizing countries, and in particular to Britain after the beginning of the American war. The $u(G)$ function has standard properties: $u'(G) > 0$ (the public good is desirable), $u''(G) < 0$ (decreasing marginal utility), $u(0) = 0$, and u twice continuously differentiable. Since the cost of production of one unit of G is 1, the optimal level of provision of the public good for the E players, G^{**} , is given by the Lindahl-Samuelson condition which sets marginal social utility equal to marginal social cost:

$$n_E \frac{\partial}{\partial(G)} u(G^{**}) = 1 \quad (2)$$

The private-goods utility P_e is equal to the income w_e for each E player minus any expenditures that must be made for the production of G : $P_e = w_e - \mathcal{T}$ where \mathcal{T} is any kind of expenditure that the E player makes for G to be produced. The income of some E players can however be affected by O players: Government officials control a number of slots that generate income for those economic agents who are given the slots. An E player who is a legislator and can receive such a slot is labeled as being part of group B and has income either $w_b = w^{-S} + w^S$ in case the slot is awarded to b or $w_b = w^{-S}$ in case it is not awarded. Therefore w^S is the income that is accrued as a result of the slot being awarded to that economic agent, and w^{-S} is the rest of the player's income. Players in C (along with all other non- B members of E) simply have private incomes $w_c = w$ which are not affected by the actions of the government. The rest of the paper assumes all incomes are large enough so that the equilibrium tax payments can be made without resorting to credit, and also that w , w^{-S} , and w^S are constants, for simplicity. This modeling approach is meant to be able to capture two situations which are key for understanding why modernization and increases in spending brought reforms to Britain but not to many contemporary countries: whether the economic elites are mostly of the dependent B -type, or the independent C -type will matter a lot for the likelihood of reforms. Maintaining the independence of the House from the government, by keeping “placeholders” and government contractors out was, of course, an objective fiercely pursued by the C -type majority, most obviously by seeking to ban such individuals from being able to become members in the first place.

For the results to be convincing, the model has to assume that public officials care about public goods just as much as all other citizens. The utility of government officials is therefore the same quasilinear sum of utilities for private and government goods:

$$U_o = P_o + \alpha u(G) \quad (3)$$

Government officials value government goods to the same degree as everyone else. Their private utility is given by the “rent” that is left for each government official after the tax T has been paid by economic agents and the amount G_o of government goods has been produced by each

government official. Therefore

$$U_o = R_o + \alpha u(G) \quad (4)$$

$$R_o = T_o - G_o \quad (5)$$

The notable fact about the strategic situation facing any individual government official is that while she faces the full cost of providing the G that is in her responsibility, she only benefits from that G in a very small proportion: for a given player o , and assuming all other O players produce the total amount of government goods G , the cost of producing G_o government goods for o is G_o , but the benefit is only $\alpha u(G + G_o) - \alpha(G)$. Similarly, looking at continuous variation the marginal cost of producing more G is 1 but the marginal benefit is only $\frac{\partial}{\partial G} \alpha u(G)$, which is n_E times smaller than the cost. This is therefore a classic case of the collective action problem facing any uncoordinated system of production of a public good. When setting up the utility maximization problem for government workers, these terms will be very small for large n_E , so approximating them with zero will provide a simplification of the exposition³.

In case reform is the outcome of the vote, then government officials are no longer free to optimize how they provide the government good. In the reformed system, they get a fixed salary which reflects the opportunity cost of their labor and have to provide a fixed quantity of the good G .⁴ The salary earned by government officials is normalized to zero for simplicity, and they therefore have to use all of the tax payment for the provision of G . Also T is set at the level T^{**} that maximizes individual utility for the tax payers, indicated in (2). (The total amount of government goods G^{**} in (2) is $n_E T^{**}$). In order to maintain this system, economic elites have to pay the administrative cost c , representing the positive and negative incentives offered to officials to do their job, each period when the reformed system is in place. In the reformed system, therefore, the per-period private utilities of members of the elite will be:

$$P_{e,Reform} = w_e - c - T^{**} \quad (6)$$

$$P_{o,Reform} = 0 \quad (7)$$

The government-goods component of the utility function remains unchanged.

The process by which the dependent economic agents in B interact with the government is modeled as a simple legislative bargaining process between each one of them individually and the O group as a whole. Whenever a vote on corruption or reform is taken, government officials can

³Any case in which G is a private good to be consumed by the tax/bribe-payer will be similar, in that the individual government official does not bear any burden for the non-production of the good. In the very unlikely case in which G is a public good produced by just one official, the conclusions do not carry through, as the official bears the full burden of non-provision.

⁴This assumes a setting in which, as was the case in the Britain, the decisions of the legislative are actually put in practice. When the legislative lacks these constitutional powers, or when it is simply unable to control the executive in practice, such a pathway to reform is not available.

condition the awarding of the n_B rents, worth w^S each, for that period, on the expressed votes of economic elites. The strategy used by O in any equilibrium is one that maximizes the likelihood of generating votes in favor of corruption (which will be shown to be optimal for government workers in case they themselves favor corruption over reform): for the n_B members of B , make a proposal for an extended policy vector to replace the simple binary agenda $\mathcal{B}^1 = (\text{corruption}, \text{reform})$ with the following composite binary agenda, where one component of the agenda is made up of a vector of size two: $\mathcal{B}^2 = ((\text{corruption}, w^S), (\text{reform}, 0))$. In this case, B players are voting on the agenda \mathcal{B}^2 , not on the agenda \mathcal{B}^1 , which is the one being voted on by the C players. Therefore, B players know that a vote for reform also means a vote to replace the rent w^S with 0, and adapt their best responses to the other players' actions accordingly.

The equilibrium of the one-period game, without repeated play, and in case C forms a majority in the legislature, is obvious once the incentives facing the individual government official are considered. The government officials cannot commit to not extracting the entire tax payment as rents, because each one of them individually loses only a small amount of public good utility by not providing any G , but would lose a large amount of private utility by using the tax payment to produce G . The subgame perfect equilibrium of the period game can be computed through backward induction: In the third stage, without reform, each government official solves the simple problem $\arg \max_{G_o} T_o - G_o + \alpha u(G)$ s.t. $G_o \in [0, T_o]$. The effect of the production of G by one government official on his or her own utility from overall G can be approximated by zero, and this leads to the solution $G_o \approx 0$, which is the natural outcome of the strategic situation facing the individual government official (see proofs section). Knowing this, in the second stage, the economic elites solve: $\arg \max_T w - T + 0$ s.t. $T \in [0, w]$ which leads to $T = 0$ as a solution (proofs section). Knowing that their entire tax payment would be captured by government officials, economic agents would not pay any taxes. This leaves them with the utility level $U_{e, \text{Corruption}} = w_e$. When voting in the first stage, players in C compare this to the payoff from reform, which is: $U_{c, \text{Reform}} = w - T^{**} - c + \alpha u(G^{**})$

The condition for reform is $U_{c, \text{Corruption}} \leq U_{c, \text{Reform}} \iff w \leq w - T^{**} - c + \alpha u(G^{**})$, which leads to the first result:

Proposition 1: *Without repeated play, the unique subgame perfect equilibrium outcome of the game is determined by the condition $c \leq \alpha u(G^{**}) - T^{**}$. If this condition holds, all C players vote for reform in the first stage and reform is enacted. If the condition does not hold, corruption is the outcome of the game, the equilibrium tax payment is $T^* = 0$ and the equilibrium amount of government goods produced is $G^* = 0$.*

The condition that the administrative cost of reform is (much) smaller than the net utility that public goods provision can bring to the economy is natural for the case at hand: a lack of provision of G would correspond to an ‘‘anarchical’’ outcome in which no government services are provided, and

the assumption that reform is to be preferred to anarchy, $c \leq \alpha u(G^{**}) - T^{**}$, is made for the rest of the paper.

Under these conditions, reform would always be enacted in the one-period game. Repeated play, however, allows all players to reach better outcomes, and the fact that most corrupt societies have positive tax payments and positive production of the government good indicates that such a Pareto-improving equilibrium is the one on which players will focus. Repeated play allows the government to commit to extracting only a part of the tax payment as rents, which allows the C players to continue tolerating the corrupt system, because in this manner they can avoid paying the administrative cost of reform, and also get some government goods. Similarly, government officials have an incentive to seek to commit to not extracting the entire tax payment, as this allows them to gain some rents from corruption. In such a game, players can build a cooperative (corrupt) equilibrium, sustained by punishment strategies directed against individual government workers. Corruption therefore, is modeled as a way to ensure the production of desirable governmental goods, which in this case is more efficient for economic elites than either the non-production of such goods or their production under a reformed system. The analysis of these cooperative equilibria follows here.

The information structure of the infinitely repeated game is one of perfect and complete information, and it is common knowledge to all players. The equilibrium concept is subgame perfect equilibrium. Players use “trigger” strategies that postulate the most severe punishment in case of a deviation from the prescribed cooperative behavior. The modeling choice of focusing on trigger strategies is justified by the fact that if a cooperative equilibrium cannot be generated with such strategies, it cannot be generated with any other kinds of strategies. The pure strategies used by all players in the cooperative/corrupt equilibrium therefore are ones in which independent economic elites maintain the corrupt system and pay bribes as long as a sufficient amount from the bribes is returned as government goods, in which government officials return a sufficient amount of the payment as government goods as long as a sufficient tax payment has been made, and in which dependent economic elites support corruption and pay the amount of tax that is sufficient to keep government officials cooperating. Formally, the strategy for C players is: vote for corruption in the first stage of each period, then, along with all other E players, pay a bribe T_o^* to each o player in the second stage as long that o player provides at least G_o^* government goods and extracts at most R_o^* in rents; and switch to setting $T_o = 0$ forever for any official that deviates from these conditions. For an O player: vote for corruption in every first stage of every period, then extract R_o^* and provide G_o^* in every third stage of every period, as long as at least the bribe T_o^* is received, and switch to setting $G_o = 0$ forever as soon as these conditions have been violated. In addition, O players condition the private utility of the B players on B players’ votes, as described above. B players use strategies where they always vote for corruption, and pay the tax T^* every period in which corruption is present and T^{**} in every period in which reform is enacted. In such an equilibrium, E

players punish deviations from cooperative behavior by individual O players by removing their tax payments rather than by reforming the entire economy. The fact that these punishment strategies are most likely to generate cooperative equilibria is explained in the proofs section, and is due to the fact that if these strategies fail at maintaining cooperation, all other kinds of strategies are also likely to fail.

The value functions of O players in this corrupt equilibrium and in the best one shot deviation are given by the following two recursive equations (the asterisk denotes the equilibrium path):

$$V_o^* = \frac{1}{1 - \delta_O} (R_o^* + \alpha u(G^*)) \quad (8)$$

$$V_o^{OSD} = T_o^* + \alpha u(G^*) + \delta_O \left(\frac{0 + \alpha u(G^*)}{1 - \delta_O} \right) \quad (9)$$

Here OSD stands for the best one-shot deviation for one player, and $\delta_O \in (0, 1)$ is the discount rate of players in group O . For group O therefore, the value of staying in the cooperative equilibrium is that of receiving the rents R_o as well as the government goods for the foreseeable future. The value of the best one-stage deviation is that of capturing the entire tax payment once, and then receiving no further payments forever. Note that this requires that E players use strategies where faced with an individual deviation by one O player, they punish just that one O player, by switching to the one-period equilibrium in the interaction with him or her, rather than switching to the one-period (reform) equilibrium in all interactions. Because the actions of any individual government player do not affect players' total utility from government goods, when deviating from the cooperative path of play and extracting the maximal rent, any government worker does not face a (meaningful) change in the total utility provided by the public good, as indicated in (9).⁵ For the postulated strategies to form an equilibrium, a necessary condition is that $V_o^* \geq V_o^{OSD}$.

The value functions on the equilibrium path and for the reform at the voting stage for the C players are:

$$V_c^* = \frac{1}{1 - \delta_E} (w - T^* + \alpha u(G^*)) \quad (10)$$

$$V_c^{REF} = \frac{1}{1 - \delta_E} (w - c - T^{**} + \alpha u(G^{**})) \quad (11)$$

To these value functions needs to be added the value function for the punishment of one individual o player who deviated, in order to show that punishing that o player individually is credible. This individual-punishment value function is:

$$V_e^{*1} = \frac{1}{1 - \delta_E} (w - T^{*1} + \alpha u(G^{*1})) \quad (12)$$

Here T^{*1} is the optimal tax payments vector in which the constraint that the one o player who

⁵As mentioned in footnote 3, in case G is a private good, this logic is the same, as the individual O player is not hurt by her non-provision of G .

has deviated always receives 0 in payments. For these strategies to form a corrupt equilibrium it has to be that $V_c^* \geq V_c^{REF}$, and that individual punishments of o players, that lead to the value function V_e^{*1} if applied, are credible. Moreover, it has to be certain that if an equilibrium cannot be generated by the use of the individual punishment strategy, than it cannot be generated by other strategies, notably strategies that postulate switching to reform after individual deviations are observed. The proofs section shows that indeed the punishment is credible and a more effective punishment is not available to E players.

In the corrupt equilibrium, elites have to pay the equilibrium tax rate, which is used for rents for the government officials and for the production of G^* government goods. If C players institute reforms, these persist into the future under the given equilibrium strategies.⁶ Under the reformed system, they pay the administrative cost c as well as the tax T^{**} , which is used entirely for the production of the optimal quantity of government goods G^{**} . At the other point when C (and all other E) players need to select an action, stage two of every period, it is easy to show that there are no profitable one-shot deviations for E players from the equilibrium strategy of paying T^* : any positive non-zero tax payment $T < T^*$ leads to its confiscation by the government officials, and the beginning of the reform phase in the next period. As having the payment be confiscated cannot be better than having some positive-utility government goods be provided, such a deviation would never be profitable. Any profitable deviation in which a total tax payment of zero is desirable for the E players can only arise off the equilibrium path, as by assumption C players would always prefer enacting reforms in stage one rather than making a zero tax payment later on.

Any allocation of T , R and G that makes the two participation constraints, for O and C players, hold can generate a cooperative/corrupt equilibrium. The following analysis establishes necessary conditions for at least one such equilibrium to exist, and shows that a sufficient increase in the demand for public goods, as indicated by α , will always lead to the breakdown of any such corrupt equilibria.

The individual official's participation constraint is a simple trade-off between receiving a rent forever and stealing the entire tax payment now, so to see if cooperative equilibria exist as α increases, the official's constraint can be kept holding with equality. Doing this leads to the following equilibrium condition (derivations of the following three results are found in the proofs section):

$$R_o^* = (1 - \delta_o) T_o^* \quad (13)$$

The rest of the tax payment T^* will be returned as government goods, therefore

$$G_o^* = \delta_o T_o^* \quad (14)$$

⁶The long-run persistence of reforms is beyond the scope of this paper, but the main two ways in which reforms can persist is for the parameters of the model (size of groups, spending level, etc) to not change, or for reforms to be "sticky" in the sense of there being a cost for their removal. If both of these conditions fail, then the possibility of the reversal of reforms develops.

$$G^* = n_E \delta_O T^* \quad (15)$$

This shows that effective marginal cost of one unit of G for the E group under corruption is $\frac{1}{\delta_O}$, higher than the cost of 1 under reform (because from a $\frac{1}{\delta_O}$ payment, only 1 will be used for public good production). From this it follows that the equilibrium tax payment T^* is defined implicitly by the modified Lindahl-Samuelson condition that sets marginal total utility equal to marginal total cost under corruption:

$$n_E \alpha \frac{\partial}{\partial(G)} u(G^*) = \frac{1}{\delta_O} \quad (16)$$

This condition implicitly defines T^* , by implicitly defining G^* . Therefore, under corruption the tax payment is higher and/or the quantity of public goods is lower than under reform, but under corruption the administrative cost c is not paid. The cooperation condition given by $V_c^* \geq V_c^{REF}$ is therefore (derivation in the proofs section):

$$(\alpha u(G^*) - T^*) - (\alpha u(G^{**}) - T^{**}) + c \geq 0 \quad (17)$$

This condition is equivalent to requiring that the consumer surplus under corruption plus the cost of reform are higher than the consumer surplus under reform. It is clear that for low values of α this condition will always hold for positive c . For example, as $\alpha \rightarrow 0$, both equation (16), which defines T^* , and equation (2), which defines T^{**} , indicate $\frac{\partial}{\partial(n_E T^*)}(n_E T^*) \rightarrow \infty$ which leads to $G^* \rightarrow 0, T^* \rightarrow 0$ and $G^{**} \rightarrow 0, T^{**} \rightarrow 0$. This would make the condition for corruption be $c \geq 0$, which is always true. However, as the demand for public goods increases, as indicated by an increase in α , the condition will be violated (proofs section). The intuition is simple: as government goods become more important, economic elites would like to invest “a lot” in government goods. A cut of this investment needs to be given to the government officials to keep them cooperating, and as the required investment becomes higher, this cut will also become higher, hence the losses generated by tolerating corruption will themselves become higher. This logic applies to any kind of increases in government activity, so it applies very broadly to processes of modernization across countries, not just to the specific case of war spending in Britain.

Proposition 2: *There always exists an α^{RC} beyond which reform is preferred by C players to corruption. If $\alpha > \alpha^{RC}$, then all C players vote for reform, while if $\alpha \leq \alpha^{RC}$, corrupt equilibria can be sustained.*

If the reform condition holds for group C , then group B would not vote for reforms, as they would get the same result (reform), but lose the extra profits (this is under the assumption that O players have a reason to condition the behavior of B players). The fact that all players belonging to a group vote the same, even if any one player switching their vote would not affect their utility unless they happened to be pivotal, is given by the assumption that the players do not use weakly dominated

strategies in the voting equilibrium. An interesting question is whether it is possible for the O players themselves to prefer reforms to corruption. While under corruption they gain rents, it may be that the underprovision of the public good makes them also prefer reforms instead of corruption, for severe levels of underprovision. The condition for an O players to prefer reform to corruption is

$$V_o^{REF} \geq V_o^* \quad (18)$$

$$\frac{1}{1 - \delta_o} (\alpha u(G^{**})) \geq \frac{1}{1 - \delta_o} (R_o^* + \alpha u(G^*)) \quad (19)$$

$$R_o^* \leq \alpha u(G^{**}) - \alpha u(G^*) \quad (20)$$

However, the following result shows that as α increases, A players become less likely to prefer reforms, so if they are non-reformist at low levels of α , they are sure to stay that way.

Proposition 3: As α increases it will be the case that $R_o^* > \alpha u(G^{**}) - \alpha u(G^*)$ and hence A players become sure to prefer corruption.

As long as A players do not prefer reform, it is an equilibrium behavior for them to condition the behavior of B players in order to induce them to not vote for reforms either.

It is instructive to consider what would happen in case a B player was pivotal, instead of a C player, in the realistic case in which O players do not want reform. Now all non- B players use the same strategies as above, with B players being the ones who must be dissuaded from voting for reforms. In this case, a vote for reform means losing a share of the his or her income for the B player expressing it, so the condition for maintenance of the corrupt equilibrium that applies to a pivotal B player, instead of (17), becomes (derivation in proofs section):

$$V_b^* \geq V_b^{REF} \quad (21)$$

$$(\alpha u(G^*) - T^*) - (\alpha u(G^{**}) - T^{**}) + c + w^S \geq 0 \quad (22)$$

The choice of corruption or reform in case a B player is pivotal is given by the following proposition (see proofs section):

Proposition 4: *If a B player is pivotal, there always exists an α^{RB} beyond which the pivotal B player prefers reform. However, it is always the case that $\alpha^{RB} > \alpha^{RC}$.*

For reasonable values of the parameters, it will be the case that $\alpha^{RB} \gg \alpha^{RC}$. This is because the term w^S is the income of the B player that is dependent on the government, and it is likely to be much larger in absolute value than the other terms in the inequality. This suggests why in many corrupt societies economic elites that have political power tolerate the corruption of government of-

ficials, even though they lose some utility by doing so.⁷ The happy coincidence spending increases, legislative make-up, and legislative power over the executive that allowed Britain to engage in such reforms can fail in various ways, and whenever that happens, this particular mechanism for anti-corruption reforms will not be available.

Proofs

The official's maximization problem. The problem is:

$$\arg \max_{G_o} T_o - G_o + \alpha u(G) \quad \text{s.t. } G_o \in [0, T_o] \quad (23)$$

The necessary first order condition for an interior solution to the official's utility maximization problem is

$$\frac{\partial}{\partial G_o} (T_o - G_o + \alpha u(G)) = 0 \quad (24)$$

$$\iff 0 - 1 + \frac{\partial}{\partial G_o} \alpha u(G) = 0 \quad (25)$$

For large values of n_E , the term $\frac{\partial}{\partial G} \alpha u(G)$ will be very small, and it can be approximated by zero. Doing this in (15) above leads to $-1 = 0$, which is a contradiction, which implies no interior solutions exist. To find the argmax, it then suffices to compare the value of the official's utility function at the two extremes of the constraint set while assuming all other officials optimize in the same manner. At the point $G_o = T_o$ the utility maximizer reaches utility:

$$T_o - T_o + \alpha u \left(\sum_{o=1}^{n_O} (T_o) \right) = \alpha u \left(\sum_{o=1}^{n_O} (T_o) \right) \quad (26)$$

and at the point $G = 0$ the utility maximizer reaches utility

$$T_o - 0 + \alpha u \left(\sum_{o=1}^{n_O} (T_o) - T_o \right) \quad (27)$$

Therefore $G = 0$ is the argmax if:

$$T_o + \alpha u \left(\sum_{o=1}^{n_O} (T_o) - T_o \right) > \alpha u \left(\sum_{o=1}^{n_O} (T_o) \right) \quad (28)$$

$$T_o > \alpha u \left(\sum_{o=1}^{n_O} (T_o) \right) - \alpha u \left(\sum_{o=1}^{n_O} (T_o) - T_o \right) \quad (29)$$

⁷As mentioned in footnotes 3 and 5, the main conclusions of the model carry through to the case of the good G being private rather than public, regardless of the number of government officials needed to produce it. This is essentially because the optimization problem of the individual government official is approximately the same in the case of private goods: their individual actions regarding the provision of the good do not immediately affect their utility in this case either.

The right hand side term can be approximated by zero, so for any positive values of T_o , the condition holds, and the solution to the official's utility maximization problem is $G = 0$. Now assuming all other officials choose the solution $G = 0$, at the point $G = T_o$, the utility maximizer reaches utility

$$T_o - T_o + \alpha u(T_o) \quad (30)$$

At the point $G = 0$, the utility maximizer reaches utility

$$T_o - 0 = T_o \quad (31)$$

So in this case $G = 0$ is the argmax if

$$T_o > \alpha u(T_o) \quad (32)$$

$$\iff T_o > \alpha u(0 + T_o) - \alpha u(0) \quad (33)$$

The term on the right hand side can be approximated by zero, so $G = 0$ is the argmax in this case as well. This means the unique solution to the maximization problem faced by the individual official who takes into consideration that all other officials are maximizing in a similar fashion is $G = 0$. Of course, the result that T and G are zero is an approximation, as the small positive marginal utility at low levels of production of G would induce each official to produce some small quantity, but that effect can be ignored for simplicity of exposition. In case the small levels of production generated by the officials are not approximated by zero, the approximation assumption has to be modified slightly to argue that reform is preferable in the one-shot interaction to the very small level of public good production.

The results in (13)-(15). To keep the government official's participation constraint holding with equality, set

$$V_o^* = V_o^{OSD} \quad (34)$$

$$\iff \frac{1}{1 - \delta_o} (R_o^* + \alpha u(G^*)) = T_o^* + \alpha u(G^*) + \delta_o \left(\frac{0 + \alpha u(G^*)}{1 - \delta_o} \right) \quad (35)$$

$$\iff \frac{1}{1 - \delta_o} R_o^* + \frac{1}{1 - \delta_o} \alpha u(G^*) = T_o^* + \alpha u(G^*) + \frac{1}{1 - \delta_o} \delta_o \alpha u(G^*) \quad (36)$$

Multiply everything by $(1 - \delta_o)$:

$$R_o^* + \alpha u(G^*) = (1 - \delta_o)T_o^* + (1 - \delta_o)\alpha u(G^*) + \delta_o \alpha u(G^*) \quad (37)$$

Canceling the $u(G^*)$ terms leads to:

$$R_o^* = (1 - \delta_o)T_o^* \quad (38)$$

which is condition (13). The rest of the tax payment is returned as government goods, so

$$G_o^* = T_o^* - (1 - \delta_o)T_o^* = \delta_o T_o^* \quad (39)$$

which is condition (14) from the paper.

Condition (17) follows immediately from $V_c^* \geq V_c^{OSD}$:

$$\frac{1}{1 - \delta_E} (w - T^* + \alpha u(G^*)) \geq \frac{1}{1 - \delta_E} (w - T^{**} - c + \alpha u(G^{**})) \quad (40)$$

$$\iff -T^* + \alpha u(G^*) \geq -T^{**} - c + \alpha u(G^{**}) \quad (41)$$

$$(\alpha u(G^*) - T^*) - (\alpha u(G^{**}) - T^{**}) + c \geq 0 \quad (42)$$

Proposition 2. To show that as α goes over some α^{RC} , the condition for C tolerating corruption will always be violated, a sufficient condition is that the partial derivative with respect to α of the expression $\mathcal{E}_1 = (\alpha u(G^*) - T^*) - (\alpha u(G^{**}) - T^{**})$ is always negative, and that the growth of the expression is unbounded. Before writing this partial derivative, note that the parameters T^* , G^* , T^{**} , and G^{**} which are endogenous with respect to α are implicitly defined by their optimality conditions:

$$\frac{\partial}{\partial(G)} u(G^*) = \frac{1}{\delta_{On_e} \alpha} \quad (43)$$

$$\frac{\partial}{\partial(G)} u(G^{**}) = \frac{1}{n_e \alpha} \quad (44)$$

Note that the expression \mathcal{E}_1 is in fact the loss in consumer surplus from the corrupt system when compared to the reformed system. (An illustration is provided in figure 2). The loss in consumer surplus (Y+Z in the figure) in reform versus corruption is given by

$$\mathcal{E}_2 = -n_E \left[\left(\frac{1}{\delta_O} - 1 \right) G^* + \int_{G^*}^{G^{**}} \alpha \frac{\partial}{\partial G} u(G) dG - (G^{**} - G^*) \right] \quad (45)$$

$$= -n_E \left[\frac{1}{\delta_O} G^* - G^{**} + \alpha u(G^{**}) - \alpha u(G^*) \right] \quad (46)$$

$$= n_E \mathcal{E}_1 \quad (47)$$

The sufficient condition for \mathcal{E}_2 to become more negative is that for all α :

$$\frac{\partial}{\partial \alpha} G^* > 0 \text{ and } \frac{\partial}{\partial \alpha} G^{**} \geq 0 \quad (48)$$

This is because any additional unit of G^* could have been obtained for the lower price of 1 instead of $\frac{1}{\delta}$ under reform, so it can only add to the loss in surplus from corruption. So to establish that \mathcal{E}_1 decreases with α it suffices to show that condition (48) holds. To do so, the implicit function theorem can be applied to the two expressions that implicitly define G^* and G^{**} . Taking the first expression in (48):

$$\frac{\partial G^*}{\partial \alpha} = - \frac{\partial \left[n_E \alpha \frac{\partial}{\partial G} u(G^*) - \frac{1}{\delta_O} \right]}{\partial \alpha} \left(\frac{\partial \left[n_E \alpha \frac{\partial}{\partial G} u(G^*) - \frac{1}{\delta_O} \right]}{\partial G} \right)^{-1}$$

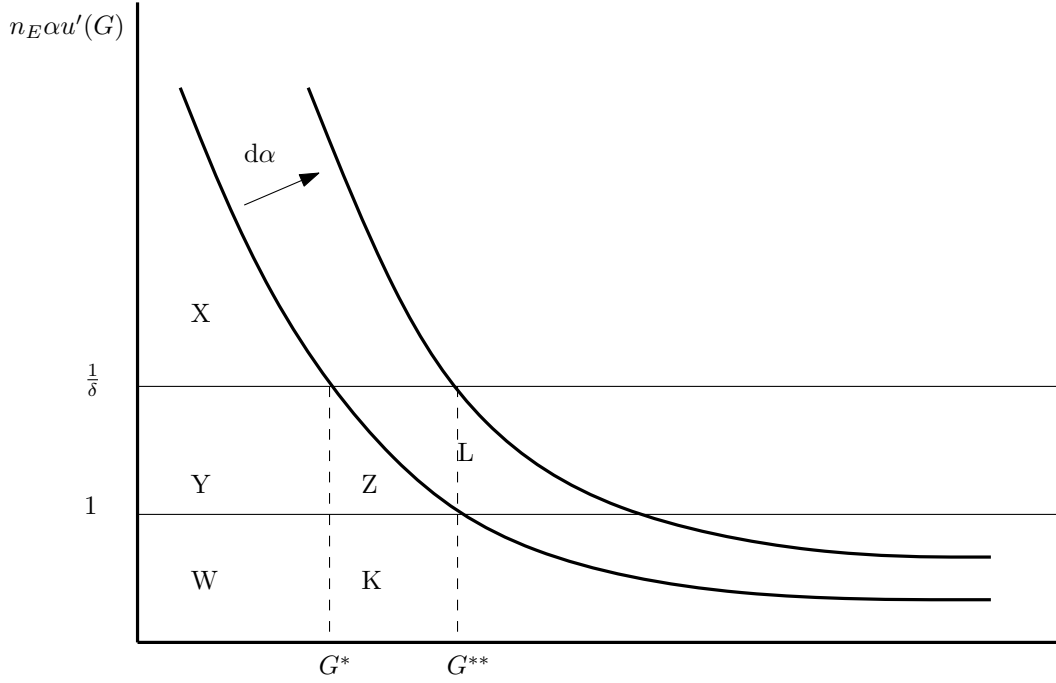


Figure 11: Consumer surplus in corruption = X; Consumer surplus in reform = X+Y+Z; Rents paid = Y; Total payment in corruption = Y+W; Total payment in reform = W+K; Loss in consumer surplus from corruption = Y+Z; Extra loss in consumer surplus with $d\alpha = L$

$$\begin{aligned}
 &= -n_E \frac{\partial}{\partial G} u(G^*) \left(n_E \alpha \frac{\partial}{\partial G} \frac{\partial}{\partial G} u(G^*) \right)^{-1} \\
 &= -\frac{\partial}{\partial G} u(G^*) \left(\alpha \frac{\partial^2}{\partial G^2} u(G^*) \right)^{-1}
 \end{aligned}$$

It is known that $\frac{\partial}{\partial G} u(G^*) > 0$ and $\frac{\partial^2}{\partial G^2} u(G^*) < 0$ so the expression on the right hand side is strictly positive, which leads to $\frac{\partial}{\partial \alpha} G^* > 0$. A similar derivation using the optimality condition for G^{**} will lead to:

$$\frac{\partial G^{**}}{\partial \alpha} = -\frac{\partial}{\partial G} u(G^{**}) \left(\alpha \frac{\partial^2}{\partial G^2} u(G^{**}) \right)^{-1}$$

This again shows that $\frac{\partial}{\partial \alpha} G^{**} > 0$, which leads to $\frac{\partial}{\partial \alpha} \mathcal{E}_1 < 0$. This shows that the loss in consumer surplus from corruption is strictly increasing in α . To be sure that as α increases the condition for tolerating corruption fails, it has to be checked that, while increasing, the loss is not bounded. Looking at \mathcal{E}_1 as a loss in consumer surplus, this is equivalent to checking that the increase in consumption of G is not bounded as α increases. This can be checked by taking the limit as α increases in the implicit definitions of G^* and G^{**} . This will lead to $\frac{\partial}{\partial G} u(G^*) \rightarrow 0$ which implies $G^* \rightarrow \infty$ and similarly $G^{**} \rightarrow \infty$. This means the loss in consumer surplus is not bounded, so there always exists an α^{RC} such that for all $\alpha \geq \alpha^{RC}$ condition (17) does not hold.

Proposition 3. To show that as α increases, A players become less likely to desire reforms, note that $\mathcal{E}_4 = \alpha u(G^{**}) - \alpha u(G^*)$ is again a difference in consumer surpluses for a consumer who

pays a price of zero for the public good (e.g. the official). From the implicit definition of G^* and G^{**} it follows that $\lim_{\alpha \rightarrow \infty} (G^{**} - G^*) = 0$, so $\lim_{\alpha \rightarrow \infty} (\alpha u(G^{**}) - \alpha u(G^*)) = 0$. The left hand side is the rent received by the o player, which is linearly dependent on the rent lost by all e players under corruption. Since the total rent lost by e players is always $\left(\frac{1}{\delta_o} - 1\right) G^*$, and it has been shown that $\frac{\partial}{\partial G} G^* > 0$ and the increase in consumption is unbounded, it follows that the rent lost by e players increases with α and is not bounded, so the rent received by each o player, which is a linear function of that, also increases with α and is not bounded. Therefore increases in α make the right hand side of the inequality lower and the left hand side higher, so higher α make A player be less in favor of reforms.

Equilibrium conditions. The fact threats to remove the tax payment of an individual O player who deviated are credible is derived from the fact that V_c^* and V_c^{*1} are equal as long as $n_o \geq 2$. This follows from the fact that n_o does not appear in the equilibrium conditions of either e or o players. So as long as the corrupt equilibrium is desirable, it is also the case that the threat of removing payments from one o player is credible. Another question is then whether it is not possible to generate corrupt equilibria that more resilient than the ones generated by the use of the individual punishments. In such an alternative equilibrium, the other credible punishment, that of having all players revert to the one-shot equilibrium in which reform is enacted, should be used. These strategies are clearly not able to generate equilibria that the individual punishment strategy cannot generate, as writing the participation constraint for o players in case they are threatened with reform leads to:

$$\begin{aligned} V_c^{*(REF)} &\geq V_c^{OSD} \\ \frac{1}{1 - \delta_o} \left(R_o^{*(REF)} + \alpha u \left(G^{*(REF)} \right) \right) &\geq T_o^{*(REF)} + \alpha u \left(G^{*(REF)} \right) + \delta_o \left(\frac{0 + \alpha u \left(G^{**} \right)}{1 - \delta_o} \right) \\ R^{*(REF)} &\geq (1 - \delta_o) T_o^* + \delta_o \alpha \left(u \left(G^{**} \right) - u \left(G^{*(REF)} \right) \right) \end{aligned}$$

Therefore the rents required for equilibria sustained by the threat of reform are greater than the rents required for equilibria sustained by the threat of individual punishment, $R_o^{*(REF)} > R_o^*$, so it cannot be that the value for c players of equilibria sustained by the threat of reform is greater than the value of equilibria sustained by the threat of individual punishments. If C players do not want to participate in a corrupt equilibrium sustained by individual punishments, they are sure to not want to participate in a corrupt equilibrium sustained by the weaker punishment of overall reform. This allows the analysis to concentrate on equilibria sustained by individual punishments.

The result in (22) is given by replacing w with $(w^{-S} + w^S)$ or w^{-S} in the value functions of B players. For players in B , the value function for the cooperative equilibrium path is similar to that for C players, with the replacement of w by $(w^{-S} + w^S)$:

$$V_b^* = \frac{1}{1 - \delta_E} \left(w^{-S} + w^S - T^* + \alpha u \left(G^* \right) \right) \quad (49)$$

However, the value function for reform has to take account of the loss of w^S :

$$V_b^{REF} = \frac{1}{1 - \delta_E} \left(w^{-S} - T^{**} - c + \alpha u(G^{**}) \right) \quad (50)$$

Setting $V_b^* \geq V_b^{REF}$ leads to

$$w^{-S} + w^S - T^* + \alpha u(G^*) \geq w^{-S} - T^{**} - c + \alpha u(G^{**}) \quad (51)$$

$$(\alpha u(G^*) - T^*) - (\alpha u(G^{**}) - T^{**}) + c + w^S \geq 0 \quad (52)$$

Proposition 4. The fact that $\alpha^{RB} > \alpha^{RC}$ is given by the fact that the pivotal B player's problem is identical to that of the C players, except the expression $\mathcal{E}_1 = (\alpha u(G^*) - T^*) - (\alpha u(G^{**}) - T^{**})$ needs to be even lower than in the case of a C player for reforms to be preferred (this is assuming O players have a reason to try to prevent B players from voting for reform). This is because now this expression needs to become lower than $(-c - w^S)$, whereas in the case of the C players, it needed to be lower than just $(-c)$ for reform to be desirable. It has been established that \mathcal{E}_1 is monotonically decreasing in α and unbounded, so it is known that above a certain α^{RB} it will become lower than the threshold $(-c - w^S)$, but as the threshold is lower than the one for C players, it is also the case that $\alpha^{RB} > \alpha^{RC}$.

References

- ***. *Journal of the House of Commons*. The House of Commons.
- D. Acemoglu. Why not a political coase theorem? social conflict, commitment, and politics. *Journal of Comparative Economics*, 31(4):620–652, 2003.
- Stephen N Broadberry, Bruce MS Campbell, Alexander Dr Klein, Mark Overton, and Bas van Leeuwen. *British economic growth: 1270-1870*. 2010.
- W. Cobbett. *The Parliamentary History of England from the Earliest Period to the Year 1803*. T.C. Hansard.
- P. Harling. The Duke of York Affair (1809) and the Complexities of War-Time Patriotism. *The Historical Journal*, 39(04):963–984, 1996.
- E. Loper and S. Bird. NLTK: The Natural Language Toolkit. pages 63–70, 2002.
- M.P. Marcus, M.A. Marcinkiewicz, and B. Santorini. Building a Large Annotated Corpus of English: The Penn Treebank. *Computational Linguistics*, 19(2):313–330, 1993.
- L.H. Officer. Purchasing Power of British Pounds from 1264 to Present. *Retrieved from www.measuringworth.com on Aug 15 2011*, 2011.