Supplementary Appendix for on-line publication.

Franchise extension and fiscal structure in the United Kingdom 1820-1913:
A new test of the Redistribution Hypothesis

A1 Construction of the local government dataset

The data on local government have been constructed from primary sources. The British Parliamentary Papers contain from 1867 to 1913 the Local Taxation Returns revenue and expenditure accounts information for a variety of difference local government units in England and Wales. The governance structures for these different units differed. The data recorded are for the Municipal Corporations and for the Local Boards, Improvement Boards, Urban Sanitary Districts and Urban District Boards where the Corporation acted as these authorities. The names (and authority) of these boards changed over the period; for simplicity we will refer to them as Municipal Boroughs as a collective and it is understood that this include only the Urban Districts where the Municipal Corporation acted. Other local government bodies (education boards, Urban District not controlled by the Corporations, county councils, poor law unions, etc.) are not included because they were not governed by the suffrage rules laid down by the House of Commons for the Corporations. Urban districts that were not Municipal Borough Corporations are not included. The rationale is that these (688) districts were not governed by the same suffrage as the boroughs till 1894 and we do not have any data on the voters in this districts which operated under a system of plural voting with richer taxpayers having more votes prior to that.

The British Parliamentary Papers and the book by Vine (1878) report information on the number of electors enfranchised for elections to the Municipal Boroughs for selected years.

Information about the population and the number of inhabited houses are obtained from the decennial Population Census of 1861, 1871, 1881, 1891, 1901 and 1911 and interpolated geometrically between the census years. The data is recorded for each Municipal Boroughs and for the area covered by the Urban District which till around 1901 differed.

Below we detail how the aggregate time series were constructed from the individual accounts for the Boroughs and from the information on the number of voters.

Definitions

- N: The size of the population to which the fiscal variable refers.
- $\frac{G}{N}$: Real (1871 prices) current and capital spending net of expenditure to repay debt (repayment of principal, interests and payment to sinking funds) and expenditures related to Burial Boards, Harbour and Port Authorities per capita.

- $\frac{T}{N}$: Real (1871 prices) current revenues net of income from Burial Boards, Harbour and Port Authorities per capita.
- $\frac{\mathbf{TAX}}{N}$: Real (1871 prices) property tax revenue (for the Corporations borough rates, general district rates, highway rates and other rates; for the Urban Districts borough rates, highway rates, general district rates and other public rates) per capita.
- $\frac{\mathbf{TAX}}{T}$: The share of property tax revenue as a percent of total current revenue.
- e_1^L: The share of the total population that registered to vote in municipal elections.

List of primary sources

- House of Commons, British Parliamentary Paper (1867). 'Return of the Number of Registered Voters on the List of All Municipal Boroughs in England and Wales and of the Numbers who Voted at the Municipal Elections in Those Boroughs for the Year 1852 and all Subsequent Years', vol. LVI, pp. 355-433.
- House of Commons, British Parliamentary Paper (1872). 'Return Showing With Respect to Each Municipal City and Borough in England and Wales, the Total Number of Municipal Electors on the Register now in Force', vol. XLVII.
- House of Commons, British Parliamentary Paper (1884-85). 'Return of Municipal Boroughs in England and Wales, Showing the Population, Number of Inhabited Houses, Number of Persons on the Burgess Rolls, Distinguishing Men From Women', vol. LXVII, pp. 23-31.
- House of Commons, British Parliamentary Paper (1897). 'Return Showing the Population and Number of Inhabited Houses (according to the Census of 1891), and the Number of Persons now on the Local Government Register of Electors each Administrative County (excluding the Municipal Boroughs), and for the County Borough and Municipal Borough in England and Wales'.
- House of Commons, British Parliamentary Paper (1867-1913), Local Taxation Returns.
- Population Census of Great Britain (1861, 1871, 1881, 1891, 1901 and 1911).

Construction of the fiscal series

The starting point is a digitalized version of the complete accounts for Municipal Corporations and the Local Boards, Improvement Commissions, Urban Sanitary Authorities and Urban District Boards. These exist starting with fiscal year 1867-68 and ending with the accounts of 1912-13. The accounting year ran from June to June and use the convention

to index each set of accounts with the year in which the accounts starts (i.e., 1867-68 is indexed by 1867).

Units The number of Municipal Borough Corporations expends over time as more and more towns get incorporated and more and more corporations decide act as sanitary authorities. We only track the sanitary authorities where the Corporation acted, i.e., control the fiscal decisions. The Public Health and Local Government Acts adopted over period by the British Parliament changed the nature of the sanitary authorities. Before 1872, the Local Board and Improvement Commissions mostly established under the 1848 Public Health Act oversaw spending on sanitation (water, sewers, gas, street draining). In 1872, the Urban Sanitary Authorities were established and many Corporation adopted to act. In 1894, the Urban Sanitary Authorities were replaced by the Urban District Boards. To simplify, we refer to these bodies as the "Urban Districts". In 1888, the biggest of the Municipal Borough Corporations became County Boroughs.

The fact that the number of Corporations expanded over time and more and more Corporation decided to act as sanitary authorities implies that we need to normalize the fiscal variables with the size of the relevant population for which the fiscal item refers to make them comparable over time. Since we have information on the population in each Municipal Corporation and in each Urban District which until around 1897 covered different geographical areas, we construct for each year the population covered for Municipal Corporations and for the Urban Boards and uses these to normative the total fiscal sums.

Consistent time series It is not straight forward to construct time series of total revenue and expenditure over time because the format of the accounts change significantly in 1882 and 1902. The calculation of property tax revenue (TAX) is not affected by this, but there are minor variations in the titles of the headings represented the rates levied by the Corporation and the Urban Districts over time which might have created minor inconsistencies. However, as the time series is "smooth" without major year on year fluctuations, we do not believe this is a significant issue.

Until 1881, current and capital spending and revenue are combined; from 1882 onwards they are recorded separately. From 1902 the revenues and expenditures related to Burial Boards, Harbour and Port Authorities are added to the accounts for the Urban Boards while they were previously not. In 1907, the accounts of the Corporations and the Urban Boards are combined into one set of accounts.

The change in the reporting format in 1881-82 causes two problems for the time series total revenue (T) and total expenditure G. For T the problem is that prior to 1881 income and expenditures from loans included loans used to repay old debt while after loans income is net of this. For this reason, we need to net loans income out prior to 1881 to get a consistent record of the evolution of current revenues. It is not possible to construct a series for loans income. For G, the problem is that the total before 1881 include spending

out of loans and we cannot separate it out, so we need to construct an expenditure series that include spending out of loans but adding the total from the loans accounts after 1882 to the current spending. However, this requires netting out "Loans repaid with interest during the year" before and after 1881 because till 1881 this item included loans repaid with new loans while it does not after. Since "loans repaid with interest during the year" are sometime combined with payments to sinking funds, this must be netted out as well for all years. So, in short, for revenue we can construct a consistent current revenue series while for spending we can construct a consistent current plus capital spending series (net of loan repayments).

From 1902, we need to net out the revenues and expenditures related to Burial Boards, Harbour and Port Authorities.

The nominal revenue and expenditures series are converted to real quantities with the Sauerbeck-Statisk price index from Mitchell (1988) with base year 1871.

Construction of the suffrage series

The Municipal Corporation Act of 1835 specified that every man who was an inhabitant householder within the borough or within seven miles thereof and who had occupied any house, warehouse, counting house[16] or shop within the borough for the previous two and a half years, provided he had been rated for the whole of that period and had paid the rates, and was duly enrolled on the Burgess Roll. Those, who, within the previous twelve months, had received parochial relief or other alms (under the Poor Laws) were excluded, and provision was made to enable a tenant, in cases where the landlord was liable for the rate, to pay them himself and so qualify for the franchise (see Vine, 1878, p 44).

While elections were held each year (with one-third on the Municipal Borough council up for election), a complete record of the numbers of electors is not preserved. The British Parliamentary Papers, however, contain four returns detailing the number of voters in each borough in 1865, 1871, 1884 and 1897 and Vine (1878) contains an addition cross section of data for 1878. For each borough, we calculate the number of voters per capita and then average across the boroughs in existence at each date. To create the time series, we assume that the number of voters increases in the years with a national reform 1869, 1878, 1882 and 1894 and that this is reflected in the cross section available at the time of the reform or immediately after. We assume that the number of voters per capita is constant in between the years with reform. Since the suffrage was linked to property tax payments and subject to the residential requirement, there will have been movements in some localities year-on-year but we cannot track this and assume that these movements are neutralized on average by movements in total population.

[16] A counting house, or computing house is the building, room, office or suite in which a business firm carries on operations, particularly accounting.

Table A1: Test of Stationarity of Franchise and Fiscal Series

	Optimal lag order	ADF
Panel A: Central government, filter war and GDP		
e_1	1	I(0)
e_2	1	I(0)
G/Y	1	I(0)
T/Y	2	I(1)
T^d/T^{in}	4	I(1)
Top	2	I(1)
Panel B: Local government, filter GDP		
e_1^L	1	I(0)
G/N	2	I(0)
T/N	2	I(1)
TAX/T	2	I(1)

Note: The table shows the ADF test results for stationarity of franchise and fiscal series. We preform the tests on series filtered with the War Dummy and GDP per capita for the central government sample and GDP per capita only for the local government sample.

A2 Details of the specification of the structural breaks and the results

Stationarity tests

We need to establish the order of integration of all the variables for both central and local government data. We begin by finding the optimal lag order for the stationarity test of both franchise and fiscal variables. We first obtain lag-order selection statistics and find the optimal lag-order for stationarity test. We set maximum lag order to 4 which is the default and use the confidence level 95%. These are sequences of likelihood-ratio test statistics for all the full autoregression models of order less than or equal to the highest lag order. There are four selection criteria (the final prediction error, Akaike's information criterion, Schwarz's Bayesian information criterion and the Hannan and Quinn information criterion) and we select the lag order which is consistent with as many criteria as possible. The optimal lag orders are reported in the Appendix table A1 along with the integration order.

Next, we conduct stationarity tests for both franchise and fiscal variables to see if any variables are I(2). We first use standard Augmented Dickey-Fuller Test (ADF) to identify unit roots. The lags are specified based on the optimal lag order already identified and the unit roots are identified at the 95% critical value. Many variables in the Appendix table A1 are I(1) but none of the series is I(2). This indicates that Autoregressive Distributed Lag (ARDL) models with an error correction form are appropriate for the structural breaks analysis.

As the series might incorporate structural breaks, we do a robustness check with the Zivot-Andrews Unit Root test which allows for a single break in intercept. This confirms that none of the series is I(2).

Implementation of the Bai-Perron test

With a mixture of stationary I(0) and non-stationary I(1) variables, the appropriate models for the marginal and conditional distributions are Autoregressive-Distributed Lag (ARDL) models with an error-correction mechanism.[17] The marginal distributions for the series are AR(p) models where each variable is regressed on a constant and on a number of own lags (p). The conditional distributions are specified as ARDL(p,q) models in which the dependent variable is explained by lagged values of itself and by the current value and successive lags of the conditioning variable. For example, the ARDL(p,q) model for e_1 conditional on the $\frac{T}{Y}$ incorporates p lags of e_1 and the contemporaneous value and q lags of $\frac{T}{Y}$. The optimal lag orders in the AR(p) and ARDL (p,q) models are determined by minimising Akaike's information criterion (AIC). The models are estimated by Ordinary Least Squares (OLS). Appendix Table A2 and A3 show the detailed specifications of these models.

With these ARDL representations of the marginal and conditional distributions, we implement the structural breaks tests developed by Bai and Perron (2003) rather than the Chow test used by Hoover and Sheffrin (1992) and Hoover and Siegler (2000).[18] There are five varieties of the Bai-Perron test and we report results for all of them.[19] Two of these uses local search algorithms. The "Sequential test, all subsets" method splits the data into subsets and tests for an additional break point in each of these subsets, for a given pre-specified number of break points. The "Sequential L+1 breaks vs. L" method chooses the single added break point that reduces the sum of squares of the test statistics the most. The remaining three tests ("Global vs. none", "Global L+1 vs. L" and "Global information criteria" methods) employ global optimization procedures. The "Global information criteria" method uses the Schwarz criterion or the LWZ criterion (which is a modification

[17] The error-correction model is suitable for a mixture of I(0) and I(1) data, i.e., when some series are I(1) while others are stationary (there is also the possibility of co-integration among some of the I(1) variables). As most of the series that we consider are I(1), the model should be written in first-differences of the dependent variable and explanatory variables. This is, however, a simple re-parametrization of the level equation once the lagged dependent variable and the contemporaneous value of the independent variable are included. As both yield the error-correction form and it is easier to implement the structural break tests in levels, we use the ARDL(p,q) models in levels to conduct the structural breaks test.

[18] The Bai-Perron tests (Bai and Perron, 2003) are superior to sequential Chow tests for a number of reasons. First, the Bai-Perron tests allow for multiple unknown structural breaks. Second, the Chow test requires us to pre-specify a "tranquil period", i.e., a period where we are sure that no structural breaks took place. This requires a judgement and the test results are sensitive to this, and it is not obvious which periods we should treat as "tranquil" in our application. Third, the Chow test can only identify one break point at the time in a given (known) year, and estimating break points outside "tranquil periods" one by one without a global maximisation procedure that takes the joint pattern of multiple break points into account can bias the results.

[19] We carry out the structural breaks tests in EViews 9.

of the Schwarz criterion) to approximately determine structural breaks. There are four sub-methods associated with the "Global L breaks vs. none" method. We use the method "Selecting Highest Significant". It chooses the largest number of breaks from among the significant tests. We make the same choice for the "Global L+1 vs. L" method.

We implement Bai-Perron tests in EViews 9. This requires a range of specification choices. Standard errors in the model specifications are ordinary for regressions without autocorrelation and HAC for series with autocorrelation in the error term (We choose HAC Newey-west method as the HAC option as is recommended on the official EViews manual). Among the whitening options we choose the Quadratic-spectral for kernel selection also as recommended. As there are 3 obvious break points in the franchise series, to maximise the power of break tests, we choose 3 as the maximal number of break points in the franchise series. For the fiscal series and all conditional distributions, we start from 3 and sequentially increase the number, until the number of break points does not further increase with the maximal number of break points we set. It is also required that data at the very left and right of the interval should be trimmed. We use 5% level. If it leads to singular matrix, we then use the trimmed level which is as small as possible (10% or 15%). We test the structural breaks on both the coefficients of the level (or their lagged terms) of the independent variables as well as the constant. Tables A4 and A5 report the results of the structural breaks tests.

Table A2: Regression Model Specifications for the Central Government Sample: Filtered with War Dummies and GDP

	ARDL (p,q)	Regression
Marginal distribution		
e_1	AR(1)	X = L.X
e_2	AR(1)	X = L.X
G/Y	AR(2)	Y = L.Y + L2.Y
T/Y	AR(3)	Y = L.Y + L3.Y + c
T^d/T^{in}	AR(2)	Y = L.Y + L2.Y + c
Top	AR(1)	Y = L.Y + c
Conditional Y on X		
G/Y on e_1	ARDL(1,0)	Y = L.Y + X
G/Y on e_2	ARDL(3,1)	Y = L.Y + X + L.X + c
T/Y on e_1	ARDL(3,1)	Y = L.Y + X + L.X
T/Y on e_2	ARDL(3,0)	Y = L.Y + L3.Y + X + c
T^d/T^{in} on e_1	ARDL(2,0)	Y = L.Y + L2.Y + X
T^d/T^{in} on e_2	ARDL(2,2)	Y = L.Y + L2.Y + X + c
Top on e_1	ARDL(1,1)	Y = L.Y + X + L.X
Top on e_2	ARDL(1,1)	Y = L.Y + X + L.X + c
Conditional X on Y		
e_1 on G/Y	ARDL(1,4)	X = L.X + L3.Y + L4.Y + c
e_2 on G/Y	ARDL(2,4)	X = L.X + Y + L.Y + L3.Y + L4.Y
e_1 on T/Y	ARDL(1,1)	X = L.X + Y + L.Y + c
e_2 on T/Y	ARDL(1,4)	X = L.X + L.Y + L2.Y + L3.Y + L4.Y
e_1 on T^d/T^{in}	ARDL(1,0)	X = L.X + Y
e_2 on T^d/T^{in}	ARDL(1,4)	X = L.X + Y + L3.Y
e_1 on Top	ARDL(1,1)	X = L.X + Y + L.Y
e_2 on Top	ARDL(1,3)	X = L.X + Y + L.Y + L2.Y + L3.Y

Note: The table shows the full ARDL(p,q) model as well as the parsimonious form of the model specification for further structural break tests on the data filtered with war dummies as well as GDP. Y and X refer to Y_t and X_t. $Lk.Y$ and $Lk.X$ refers to Y_{t-k} and X_{t-k}. c is the constant. AIC is used to select the lag structure. We also perform some post-estimation tests to validate the models. Firstly, we calculate Durbin-Watson (DW) statistics to detect the presence of autocorrelation in the residuals (prediction errors) from the regression analysis. We find that the errors of our models are serially independent. Secondly, we conduct Augmented Dickey Fuller (ADF) test on the residuals of the models to show that they are dynamically stable. These results are available upon request.

Table A3: Regression Model Specifications for the Local Government Sample: Filtered with GDP

	ARDL (p,q)	Regression
Marginal distribution		
e_1^L	AR(1)	X = L.X
G/N	AR(2)	Y = L.Y
T/N	AR(2)	Y = L.Y + L2.Y
TAX/T	AR(2)	Y = L.Y + L2.Y
Conditional Y on X		
G/N on e_1^L	ARDL(1,2)	Y = L.Y + X + L2.X + c
T/N on e_1^L	ARDL(1,2)	Y = L.Y + X + L.X + L2.X + c
TAX/T on e_1^L	ARDL(2,1)	Y = L.Y + L2.Y + X + L.X
Conditional X on Y		
e_1^L on G/N	ARDL(1,1)	X = L.X + Y + L.Y
e_1^L on T/N	ARDL(1,1)	X = L.X + Y + L.Y
e_1^L on TAX/T	ARDL(1,0)	X = L.X + Y

Note: The table shows the full ARDL(p,q) model as well as the parsimonious form of the model specification for further structural break tests on the data filtered with GDP. Y and X refer to Y_t and X_t. $Lk.Y$ and $Lk.X$ refers to Y_{t-k} and X_{t-k}. c is the constant. AIC is used to select the lag structure.

A3 Application of the Hoover algorithm

In this appendix, we explain how we applied test A and B to generate the results in Table 5 and Table 6. For ease of reference, the algorithm behind the two tests are repeated here.

Test A: (i) check that $D(e|f)$ and $D(e)$ break in year t; (ii) use Table A6A to check if in year t, $D(f)$ and $D(f|e)$ are stable or not and draw the inference indicated.

Test B: (i) check that $D(f|e)$ and $D(f)$ break in year t; (ii) use Table A6B to check if in year t, $D(e)$ and $D(e|f)$ are stable or not and draw the inference indicated.

A prerequisite for drawing causal inferences from test A and test B is that the historical narrative clearly indicates that there was an intervention in the suffrage (test A) or in the fiscal system (test B) in year t. We allow for an interval around each intervention identified in the historical narrative analysis of plus/minus two years and associate a statistical break point within these intervals with the intervention from the narrative analysis. For the central government data, the intervals for the interventions in suffrage series are defined related to the year of the first election under the new rules; for the local government data, we note that one-third of the councils were elected each year and the narrative intervals are defined relative to year after the reform (so that two-third of the councilor are elected on the new rules). For the interventions in the fiscal series which are timed to a particular year, we define the intervals relative to the corresponding fiscal year. We call these intervals the *narrative intervals*.

Constructing Table 5 Central government

The national level raw series have been filtered with the war dummies and with real GDP per capita and the structural breaks tests are preformed on the residuals from the associated regressions.

Test A

For test A, the relevant narrative intervals are (see Table 3, column four)

- **First Reform Act 1882, first election in 1832**: 1830-34.
- **Second Reform Act 1867, first election in 1868**: 1866-70.
- **Secret Ballot 1872, first election in 1874**: 1872-76
- **Corrupt Practices Act 1883; Third Reform Act 1884; Redistribution Act 1885; first election in 1885**: 1883-87.
- **Parliamentary Act 1911**: 1909-13.

Table A4: Break Points in the Marginal Distributions of the Fiscal and Franchise Series: Filtered with War Dummies and GDP per Capita for the Central Government Data and for GDP per Capita for the Local Government Data

	Sequential L+1 vs. L	Sequential all	Global vs. none	Global L+1 vs. L	Global information criteria
Central government					
e_1	None	None	1866, 1885, 1889	1885, 1889	1885, 1889
e_2	None	None	None	None	None
G/Y	None	None	1875, 1879, 1884	1875, 1879, 1884	None
T/Y	1836, 1840, 1846, 1857	1836, 1840, 1846, 1857	1857, 1875, 1879, 1899, 1903	1857, 1875, 1879, 1899, 1903	None
T^d/T^{in}	1858, 1899, 1903, 1909	1858, 1879, 1899, 1903, 1909	1871, 1879, 1899, 1903, 1909	1871, 1879, 1899, 1903, 1909	1909
Top	1901	1901	1876, 1880, 1888, 1895, 1900	1876, 1880, 1888, 1895, 1900	None
Local government					
e_1^L	None	None	1869, 1872, 1909	1869, 1872, 1909	None
TAX$/T$	1877	1877	1882, 1892, 1901	1882, 1892, 1901	1871, 1873, 1875
G/N	1905	1905	1891, 1895, 1905	1891, 1895, 1905	None
T/N	1905	1905	1882, 1891, 1905	1905	1908, 1910

Note: The table reports the years with break points in the marginal distribution of the franchise and fiscal series. We perform five varieties of Bai and Perron tests in Eviews 9. Details are explained in Supplementary Appendix A2.

Table A5: Break Points in the Conditional Distributions of Fiscal Variables and Franchise Extension: Filtered with War Dummies and GDP per capita for the central government data and with GDP per capita for the local government data

	Sequential L+1 vs. L	Sequential all	Global vs. none	Global L+1 vs. L	Global information criteria
Panel A: The Conditional Distributions of the Fiscal series conditional on the Franchise series, $D(f\,|\,e)$					
Central government					
$D(G/Y\,|\,e_1)$	None	None	1853, 1857, 1878, 1899, 1903	1853, 1857, 1878, 1899, 1903	1853, 1857, 1878, 1899, 1903
$D(T/Y\,|\,e_1)$	1828, 1834, 1839, 1853, 1857	1828, 1834, 1839, 1853, 1857	1857, 1870, 1879, 1886, 1903	1857, 1870, 1879, 1886, 1903	1878, 1884
$D(T^d/T^{in}\,\big|\,e_1)$	1871, 1903, 1908	1871, 1879, 1884, 1903, 1908	1871, 1880, 1884, 1903, 1909	1871, 1880, 1884, 1903, 1909	1908
$D(Top\,|\,e_1)$	1869, 1873, 1878, 1883, 1887	1878, 1883, 1887, 1896, 1900	1853, 1862, 1876, 1886, 1900	1853, 1862, 1876, 1886, 1900	1873, 1886
$D(G/Y\,|\,e_2)$	None	None	1849, 1858, 1876, 1885, 1899	1849, 1858, 1876, 1885, 1899	1849, 1858, 1876, 1885, 1899
$D(T/Y\,|\,e_2)$	1834, 1846, 1857, 1885, 1903	1834, 1846, 1857, 1885, 1903	1857, 1870, 1885, 1896, 1905	1857, 1870, 1885, 1896, 1905	None
$D(T^d/T^{in}\,\big|\,e_2)$	None	None	1853, 1862, 1871, 1885, 1903	1853, 1862, 1871, 1885, 1903	1871, 1885, 1903
$D(Top\,|\,e_2)$	1888, 1899	1834, 1869, 1878, 1888, 1899	1834, 1858, 1871, 1885, 1899	1834, 1858, 1873, 1886	1870, 1886
Local government					
$D(\mathrm{TAX}/T\,|\,e_1^L)$	1876, 1882, 1891	1876, 1882, 1891	1874, 1889, 1883	1876, 1882, 1891	1874, 1879, 1883
$D(\mathrm{G}/N\,|\,e_1^L)$	1874, 1888, 1901	1874, 1888, 1901	1872, 1888, 1901	1874, 1888, 1901	1872, 1888, 1901
$D(\mathrm{T}/N\,|\,e_1^L)$	1874, 1884, 1901	1874, 1884, 1901	1874, 1884, 1901	1874, 1884, 1901	1874, 1884, 1901
Panel B: The Conditional Distributions of the Franchise Series conditional on the Fiscal Series, $D(e\,|\,f)$					
Central government					
$D(e_1\,|\,G/Y)$	None	None	1869, 1873, 1883, 1887, 1900	1869, 1873, 1883, 1887, 1900	1882, 1886
$D(e_1\,|\,T/Y)$	None	None	1831, 1844, 1869, 1885, 1894	1831, 1844, 1869, 1885, 1894	1869, 1885, 1894
$D(e_1\,|\,T^d/T^{in})$	None	None	1866, 1870, 1885, 1895, 1900	1866, 1870, 1885, 1895, 1900	1866, 1870, 1885, 1895
$D(e_1\,|\,Top)$	None	None	1834, 1869, 1873, 1885, 1889	1834, 1843, 1869, 1885, 1895	1869, 1885, 1889
$D(e_2\,|\,G/Y)$	1885, 1894, 1905	1885, 1894, 1905	1833, 1869, 1882,1894, 1905	1833, 1869, 1882,1894, 1905	1869, 1882, 1894
$D(e_2\,|\,T/Y)$	None	None	1857, 1869, 1884, 1893, 1903	1857, 1869, 1884, 1893, 1903	1869, 1884, 1893
$D(e_2\,|\,T^d/T^{in})$	None	None	1869, 1885, 1892, 1902, 1909	1869, 1885, 1892, 1902, 1909	1869, 1885, 1894
$D(e_2\,|\,Top)$	None	None	1835, 1858, 1869, 1884, 1893	1835, 1858, 1869, 1884, 1893	1835, 1869, 1884, 1893
Local government					
$D(e_1^L\,\big|\,\mathrm{TAX}/T)$	None	None	1870, 1878, 1882	1878, 1882, 1909	1870, 1878, 1882
$D(e_1^L\,\big|\,G/N)$	1872, 1879	1872, 1879	1872, 1876, 1881	1874, 1879	none
$D(e_1^L\,\big|\,T/N)$	1872, 1879	1872, 1879	1872, 1876, 1880	1872, 1879	1872

Note: The table reports the years in which there are (statistical) break points in conditional distribution of the fiscal series conditional on franchise series (panel A) and franchise series conditional on the fiscal series (panel B), respectively. We perform five varieties of Bai and Perron tests in Eviews 9. Details are explained in Supplementary Appendix A2.

Table A6: How to determine the causal order from patterns of structural breaks

Table A

		$D(f)$	
		Stable	Unstable
$D(f\|e)$	Stable	$f \perp e$	$e \rightarrow f$
	Unstable	$e \leftarrow f$	$f \leftrightarrow e$

Table B

		$D(e)$	
		Stable	Unstable
$D(e\|f)$	Stable	$f \perp e$	$e \leftarrow f$
	Unstable	$e \rightarrow f$	$f \leftrightarrow e$

Notes: Panel A or B are used to draw conclusions about the causal order conditional on test A or test B having been passed. The arrows indicate the direction of causality and $\perp$ means that the two are independent.

There are, according to Table A4, no statistical breaks in $D(e_2)$. This means that test A is not informative about the relationship between e_2 and the fiscal variables. $D(e_1)$ breaks in 1885 according to three of the five tests, i.e., in the interval 1883-87 but there is only one test that indicates a break in 1866, so this does not qualify as a break point under the "two breaks rule". We record below what inference can be drawn if we accept that break in the 1866-70 interval for e_1 based on one test only.

Variable $\frac{T^d}{T^{in}}$. Check if $D(e_1|\frac{T^d}{T^{in}})$ breaks within the interval 1883-87 and in 1866-70. From Table A5, panel B, we conclude

- $D(e_1|\frac{T^d}{T^{in}})$ breaks in 1885, i.e., in the 1883-87 interval.
- $D(e_1|\frac{T^d}{T^{in}})$ breaks in 1866, i.e., in the 1866-70 interval.

Check if $D(\frac{T^d}{T^{in}})$ breaks or is stable in the 1883-87 and 1866-70 intervals. From Table A4, we conclude that

- $D(\frac{T^d}{T^{in}})$ is stable in the 1883-87 interval.
- $D(\frac{T^d}{T^{in}})$ is stable in the 1866-70 interval (it breaks in 1871).

Check if $D(\frac{T^d}{T^{in}}\Big|e_1)$ breaks or is stable in the 1883-87 and 1866-70 intervals. From Table A5, panel A, we conclude that $D(\frac{T^d}{T^{in}}\Big|e_1)$ breaks in the 1883-87 interval (in 1884) but not in the 1866-70 interval (it breaks in 1871). From Table A6A, we conclude that $\frac{T^d}{T^{in}} \rightarrow e_1$ in 1883-87 and that $\frac{T^d}{T^{in}} \perp e_1$ in 1866-70.

Variable $\frac{G}{Y}$. Check if $D(e_1|\frac{G}{Y})$ breaks within the intervals 1883-87 and 1866-70. From Table A5, panel B, we conclude that

- $D(e_1|\frac{G}{Y})$ breaks in 1886 and 1887, i.e., in the 1883-87 interval.
- $D(e_1|\frac{G}{Y})$ breaks in 1869, i.e., in the 1866-70 interval.

Check if $D(\frac{G}{Y})$ breaks or is stable in the 1883-87 and 1866-70 intervals. From Table A4, we conclude that

- $D(\frac{G}{Y})$ breaks in 1884, i.e., in the 1883-87 interval.
- $D(\frac{G}{Y})$ is stable in the 1866-70 interval.

Check if $D(\frac{G}{Y}\big|\, e_1)$ breaks or is stable in the 1883-87 and 1866-70 intervals. From Table A5, panel A, we conclude that $D(\frac{G}{Y}\big|\, e_1)$ is stable in both intervals. From Table A6A, we conclude that $e_1 \rightarrow \frac{G}{Y}$ in 1883-87 and that $e_1 \perp \frac{G}{Y}$

Variable $\frac{T}{Y}$. Check if $D(e_1|\, \frac{T}{Y})$ breaks within the 1883-87 and 1866-70 intervals. From Table A5, panel B, we conclude that

- $D(e_1|\, \frac{T}{Y})$ breaks in 1885, i.e., in the 1883-87 interval.
- $D(e_1|\, \frac{T}{Y})$ breaks in 1869, i.e., in the 1866-70 interval.

Check if $D(\frac{T}{Y})$ breaks or is stable in the 1883-87 and 1866-70 intervals. From Table A4, we conclude that

- $D(\frac{T}{Y})$ is stable in the 1883-87 interval.
- $D(\frac{T}{Y})$ is stable in the 1866-70 interval.

Check if $D(\frac{T}{Y}\big|\, e_1)$ breaks or is stable in the 1883-87 and 1866-70 intervals. From Table A5, panel A, we conclude that $D(\frac{T}{Y}\big|\, e_1)$ breaks in 1870, 1884 and 1886, i.e., in the intervals 1866-70 and 1883-87. From Table A6A, we conclude that $e_1 \leftarrow \frac{T}{Y}$ in 1866-70 and 1883-87.

Variable Top. Check if $D(e_1|\, Top)$ breaks within the intervals 1883-87 and 1866-70. From Table A5, panel B, we conclude that

- $D(e_1|\, Top)$ breaks in 1885, i.e., in the 1883-87 interval.
- $D(e_1|\, Top)$ breaks in 1869, i.e., in the 1866-70 interval.

Check if $D(Top)$ breaks or is stable in the 1883-87 and 1866-70 intervals. From Table A4, we conclude that

- $D(Top)$ is stable in the 1883-87 interval (there is a break in 1888).
- $D(Top)$ is stable in the 1866-70 interval.

Check if $D(Top|\, e_1)$ breaks or is stable in the interval 1883-87 and 1866-70. From Table A5, panel A, we conclude that $D(Top|\, e_1)$ breaks in both intervals (in 1869, 1883, 1886, and 1887). From Table A6A, we conclude that $e_1 \leftarrow Top$ in 1883-87 and in 1866-70.

Test B

For test B, the relevant narrative intervals are (see Table 3, column four)

- **Income tax, 1842**: 1840-44.
- **Corn Law, 1846**: 1844-48.
- **Gladstone's fiscal constitution established**: 1853-57.
- **Gladstone's fiscal constitution abolished**: 1894-1900.
- **Asquith's budget, 1906**: 1904-08.
- **Lloyd George's budget, 1909**: 1907-11.

Variable $\frac{T^d}{T^{in}}$. The following statistical breaks in $D(\frac{T^d}{T^{in}})$ recorded in Table A4 coincide with the narrative intervals for the fiscal system listed above:

- $D(\frac{T^d}{T^{in}})$ breaks in 1899 and 1909 according to at least two tests and we conclude that $D(\frac{T^d}{T^{in}})$ breaks statistically within the narrative intervals 1894-1900 and 1907-11. We observe two breaks just outside the narrative intervals 1904-08 (in 1903) and 1853-57 (in 1858), but we maintain that they are outside.

Check if $D(\frac{T^d}{T^{in}}\Big| e_1)$ and $D(\frac{T^d}{T^{in}}\Big| e_2)$ break within the intervals 1894-1900 and 1907-11. From Table A5, panel A, we conclude that

- $D(\frac{T^d}{T^{in}}\Big| e_1)$ breaks in 1908 and 1909, i.e., in the 1907-11 interval but is stable in the interval 1894-00.
- $D(\frac{T^d}{T^{in}}\Big| e_2)$ is stable in both intervals, so no conclusion can be drawn from test B about the causal relationship between e_2 and $\frac{T^d}{T^{in}}$.

Check if $D(e_1)$ and $D(e_1|\frac{T^d}{T^{in}})$ break or are stable in the 1907-11 interval from Table A4 and Table A5, panel B. We find

- $D(e_1)$ is stable in the 1907-11 interval.
- $D(e_1|\frac{T^d}{T^{in}})$ is stable in 1907-11 interval.

From Table A6B, we conclude that $e_1 \perp \frac{T^d}{T^{in}}$ in 1907-11.

Variable $\frac{G}{Y}$. There are no statistical breaks in $D(\frac{G}{Y})$ recorded in Table A4 that coincide with the narrative intervals for the fiscal system. Thus, test B is not informative about the causal relationship between e_1 and e_2 on the one hand and $\frac{G}{Y}$ on the other.

Variable $\frac{T}{Y}$. The following statistical breaks in $D(\frac{T}{Y})$ recorded in Table A4 coincide with the narrative intervals for the fiscal system listed above:

- $D(\frac{T}{Y})$ breaks in 1840, 1846, 1857, and 1899 according to at least two tests; we conclude that $D(\frac{T}{Y})$ breaks statistically within the narrative intervals 1840-44, 1844-48, 1853-57 and 1894-1900.

Check if $D(\frac{T}{Y}\big|\, e_1)$ and $D(\frac{T}{Y}\big|\, e_2)$ break within the intervals 1840-44, 1844-48, 1853-57 and 1894-1900. From Table A5, panel A, we conclude that

- $D(\frac{T}{Y}\big|\, e_1)$ breaks in 1853 and 1857, i.e., within the interval 1853-57 but not in the other three intervals.
- $D(\frac{T}{Y}\big|\, e_2)$ breaks in 1846, 1857 and 1896, i.e., within the intervals 1844-48, 1853-57 and 1894-00.

Check if $D(e_1)$ and $D(e_1|\, \frac{T}{Y})$ break or are stable in the 1853-57 interval from Table A4 and Table A5, panel B. We find

- $D(e_1)$ is stable in the 1853-57 interval.
- $D(e_1|\, \frac{T}{Y})$ is stable in 1853-57.

From Table A6B, we conclude that $e_1 \perp \frac{T}{Y}$ in 1853-57.
Check if $D(e_2)$ and $D(e_2|\, \frac{T}{Y})$ break or are stable in the intervals 1844-48, 1853-57, and 1894-00 from Table A4 and Table A5, panel B. We find

- $D(e_2)$ is stable in the intervals 1844-48, 1853-57 and 1894-00.
- $D(e_2|\, \frac{T}{Y})$ breaks in 1857, i.e., in the 1853-57 interval but is stable in the other two, although we observe that there is a break in 1893.

From Table A6B, we conclude that $e_2 \perp \frac{T}{Y}$ in 1844-48 and 1894-00 and that $e_2 \rightarrow \frac{T}{Y}$ in 1853-57.

Variable Top**.** The following statistical breaks in $D(Top)$ recorded in Table A4 coincide with the narrative intervals for the fiscal system listed above:

- $D(Top)$ breaks in 1895 and in 1900 according to at least two tests; we conclude that $D(Top)$ breaks statistically within the narrative interval 1894-00.

Check if $D(Top|\, e_1)$ and $D(Top|\, e_2)$ break within the interval 1894-1900. From Table A5, panel A, we conclude that

- $D(Top|\, e_1)$ breaks in 1896 and 1900, i.e., within the interval 1894-1900.
- $D(Top|\, e_2)$ breaks in 1899, i.e., within the interval 1894-1900.

Check if $D(e_1)$ and $D(e_1|\, Top)$ break or are stable in the 1894-00 interval from Table A4 and Table A5, panel B. We find

- $D(e_1)$ is stable in the 1894-1900 interval.
- $D(e_1|\,Top)$ breaks according to one test in 1895, but this is not sufficient to conclude that there is a break in the 1894-1900 interval and we conclude it is stable.

From Table A6B, we conclude that $e_1 \perp Top$ in 1894-1900.
Check if $D(e_2)$ and $D(e_2|\,Top)$ break or are stable in the interval 1894-1900 from Table A4 and Table A5, panel B. We find

- $D(e_2)$ is stable in the interval 1894-1900.
- $D(e_2|\,Top)$ is stable in the interval 1894-1900, although we observe that there is a break in 1893.

From Table A6B, we conclude that $e_2 \perp Top$ in 1894-1900.

Constructing Table 6 Local government

The local government level raw series have been filtered with real GDP per capita and the structural breaks tests are preformed on the residuals from the associated regressions.

Test A

For test A, the relevant narrative intervals are (see Table 4, column four)

- **Municipal Franchise Art 1869**: 1868-72.
- **The Parliamentary and Municipal Registration Act 1878**: 1877-81.
- **Municipal Corporation Act 1882**: 1881-85.
- **County Electors Act**: 1887-91.
- **Local Government Act**: 1893-97.

There are, according to Table A4, $D(e_1^L)$ breaks in 1869 and 1872 according to two of the five tests, i.e., in the interval 1868-72.

Variable $\frac{\mathbf{TAX}}{T}$. Check if $D(e_1^L \Big| \frac{\mathrm{TAX}}{T})$ breaks within the interval 1868-72. From Table A5, we conclude

- $D(e_1^L \Big| \frac{\mathrm{TAX}}{T})$ breaks in 1870 according to two tests, i.e., in the 1868-72 interval.

Check if $D(\frac{\mathrm{TAX}}{T})$ breaks or is stable in the 1868-72 interval. From Table A4, we conclude that

- $D(\frac{\mathrm{TAX}}{T})$ breaks according to one test in 1871.

Check if $D(\frac{\text{TAX}}{T}\Big| e_1^L)$ breaks or is stable in the 1868-72 interval. From Table A5, there are no breaks in this interval, so we conclude that $D(\frac{\text{TAX}}{T}\Big| e_1^L)$ is stable in this interval. From Table A6A, we conclude based on one break in $D(\frac{\text{TAX}}{T})$ that $e_1^L \rightarrow \frac{\text{TAX}}{T})$. If we require two tests to confirm the break in 1871, we $\frac{\text{TAX}}{T} \perp e_1^L$ in 1868-72.

Variable $\frac{G}{N}$. Check if $D(e_1^L\Big| \frac{G}{N})$ breaks within the interval 1868-72. From Table A5, we conclude that

- $D(e_1^L\Big| \frac{G}{N})$ breaks in 1872 according to three tests, i.e., in the 1868-72 interval.

Check if $D(\frac{G}{N})$ breaks or is stable in the 1868-72 interval. From Table A4, we conclude that

- $D(\frac{G}{N})$ is stable in the 1868-72 interval.

Check if $D(\frac{G}{N}\Big| e_1^L)$ breaks or is stable in the 1868-72 interval. From Table A5, we conclude that $D(\frac{G}{N}\Big| e_1^L)$ breaks in this interval in 1872 according to two tests. From Table A6A, we conclude that $\frac{G}{N} \rightarrow e_1^L$ in 1869-72.

Variable $\frac{T}{N}$. Check if $D(e_1^L\Big| \frac{T}{N})$ breaks within the 1868-72 interval. From Table A5, we conclude that

- $D(e_1^L\Big| \frac{T}{N})$ breaks in 1872 according to two tests, i.e., in the 1869-72 interval.

Check if $D(\frac{T}{N})$ breaks or is stable in the 1868-72 interval. From Table A4, we conclude that

- $D(\frac{T}{N})$ is stable in the 1868-72 interval.

Check if $D(\frac{T}{N}\Big| e_1^L)$ breaks or is stable in the 1868-72 interval. From Table A5, we conclude that $D(\frac{T}{N}\Big| e_1^L)$ is stable in this interval. From Table A6A, we conclude that $e_1^L \perp \frac{T}{N}$ in 1868-72.

Test B

For test B, the relevant narrative intervals are (see Table 4, column four)

- **Public Health Act, 1875**: 1873-77.
- **The Local Government Act, 1888, implemented 1889**: 1887-91.
- **The Education (Balfour) Act**, 1902: 1900-1904.

Variable $\frac{\text{TAX}}{T}$. The following statistical breaks in $D(\frac{\text{TAX}}{T})$ recorded in Table A4 coincide with the narrative intervals for the local fiscal system listed above:

- $D(\frac{\text{TAX}}{T})$ breaks in 1873, 1875 and 1877 according to several tests and we conclude that $D(\frac{\text{TAX}}{T})$ breaks in the interval 1873-77.

- $D(\frac{\text{TAX}}{T})$ breaks in 1901 according to two tests and we conclude that $D(\frac{\text{TAX}}{T})$ breaks in the interval 1900-04.

Check if $D(\frac{\text{TAX}}{T}\Big| e_1^L)$ break within the intervals 1873-1977 and 1900-04. From Table A5, we conclude that

- $D(\frac{\text{TAX}}{T}\Big| e_1^L)$ breaks in 1874 and 1876 according to several tests i.e., in the 1873-77 interval but is stable in the interval 1900-04.

Check if $D(e_1^L)$ and $D(e_1^L\Big|\frac{\text{TAX}}{T})$ break or are stable in the 1873-77 or 1900-04 interval from Table A4 and Table A5. We find

- $D(e_1^L)$ is stable in the 1873-77 and 1900-04 intervals.
- $D(e_1^L\Big|\frac{\text{TAX}}{T})$ is stable in the 1873-77 and 1900-04 intervals.

From Table A6B, we conclude that $e_1^L \perp \frac{\text{TAX}}{T^{in}}$ in the 1873-77 and 1900-04 intervals.

Variable $\frac{G}{N}$. The following statistical breaks in $D(\frac{G}{N})$ recorded in Table A4 coincide with the narrative intervals for the fiscal system listed above:

- $D(\frac{G}{N})$ breaks in 1891 according to two tests; we conclude that $D(\frac{G}{N})$ breaks statistically within the narrative intervals 1887-91.

Check if $D(\frac{G}{N}\Big| e_1^L)$ breaks within the 1887-91 interval. From Table A5, we conclude that

- $D(\frac{G}{N}\Big| e_1^L)$ breaks in 1888 according to all five test, i.e., within the interval 1887-91.

Check if $D(e_1^L)$ and $D(e_1^L\Big|\frac{G}{N})$ break or are stable in the 1887-91 interval from Table A4 and Table A5. We find

- $D(e_1^L)$ is stable in the 1887-91 interval.
- $D(e_1^L\Big|\frac{G}{N})$ is stable in 1887-91.

From Table A6B, we conclude that $e_1 \perp \frac{T}{Y}$ in 1887-91.

Variable $\frac{T}{N}$. The following statistical breaks in $D(\frac{T}{N})$ recorded in Table A4 coincide with the narrative intervals for the fiscal system listed above:

- $D(\frac{T}{N})$ breaks in 1891 according one test only; so we conclude that there is not break by the two breaks criterion. If we adopt a one break criterion, there is a break in the narrative intervals 1887-91. With the two breaks criterion test B is not informative about the causal relationship between $\frac{T}{N}$ and e_1^L. We the on test criterion, it is and we get the following:

Check if $D(\frac{T}{N}\Big| e_1^L)$ breaks within the 1887-91 interval. From Table A5, we conclude that

- $D(\frac{T}{N}\Big| e_1^L)$ is stable within the interval 1887-91.

Check if $D(e_1^L)$ and $D(e_1^L\Big|\frac{T}{N})$ break or are stable in the 1887-91 interval from Table A4 and Table A5. We find

- $D(e_1^L)$ is stable in the 1887-91 interval.
- $D(e_1^L\Big|\frac{T}{N})$ is stable in 1887-91.

From Table A6B, we conclude that $e_1 \perp \frac{T}{Y}$ in 1887-91 based on the one test criterion.

A4 Results with alternative filtering of the central government data or with alternative definitions of the narrative intervals for e.

Table A7: Break Points in the Marginal Distributions of the Franchise and Fiscal Series: Filtered with War Dummies

	Sequential L+1 vs. L	Sequential all	Global vs. none	Global L+1 vs. L	Global information criteria
$D(e_1)$	1815, 1869, 1882	1815, 1833, 1869, 1882	1815, 1869, 1885	1815, 1869, 1885	1815, 1869, 1885
$D(e_2)$	1833, 1869, 1882	1815, 1833, 1853, 1869, 1882	1833, 1869, 1885	1833, 1869, 1885	1833, 1869, 1885
$D(G/Y)$	1853, 1857	1840, 1844, 1853, 1857	1853, 1857	1853, 1857	1853, 1857
$D(T/Y)$	None	None	1834, 1857, 1878, 1899	1834, 1857, 1878, 1899	None
$D(T^d/T^{in})$	1853, 1858, 1865, 1871, 1879	1853, 1858, 1865, 1871, 1879	1865, 1871, 1879, 1899, 1904	1865, 1871, 1879, 1899, 1904	1879
$D(Top)$	None	None	1857, 1892	1857, 1892	None

Note: The table reports the years with break points in the marginal distribution of the franchise and fiscal series. We perform five different Bai and Perron tests in Eviews 9. Details are explained in Supplementary Appendix A2.

Table A8: Break Points in the Conditional Distributions for the Franchise and Fiscal Series: Filtered with War Dummies

	Sequential L+1 vs. L	Sequential all	Global vs. none	Global L+1 vs. L	Global information criteria
Panel A: Conditional Distributions of Fiscal Variables on Franchise Extension, $D(f\,|\,e)$					
$D(G/Y\,|\,e_1)$	1885, 1896	1885, 1896	1878, 1887	1878, 1887	1878, 1887
$D(T/Y\,|\,e_1)$	None	None	1857, 1870, 1885	1857, 1870, 1885	None
$D(T^d/T^{in}\,|\,e_1)$	None	None	1857, 1879, 1898	1857, 1879, 1898	None
$D(Top|\,e_1)$	1808	1808	None	None	None
$D(G/Y\,|\,e_2)$	1849, 1869, 1885, 1896	1849, 1869, 1885, 1899	1846, 1859, 1878, 1896	1846, 1859, 1878, 1896	1846, 1859, 1878, 1896
$D(T/Y\,|\,e_2)$	1863, 1896	1863, 1896	1871, 1885	1863, 1896	None
$D(T^d/T^{in}\,|\,e_2)$	1885, 1904	1858, 1871, 1885, 1904	1867, 1887	1867, 1887	None
$D(Top|\,e_2)$	None	None	None	None	None
Panel B: Conditional Distributions of Franchise Extension on Fiscal Variables, $D(e\,|\,f)$					
$D(e_1|\,G/Y)$	1885, 1901	1885, 1901	1883, 1895	1883, 1895	1883, 1895
$D(e_1|\,T/Y)$	1857, 1869, 1882, 1903	1869, 1882, 1903	1857, 1870, 1885, 1901	1869, 1885, 1901	1869, 1885
$D(e_1|\,T^d/T^{in})$	1884, 1895	1884, 1895	1877, 1893	1884	1884
$D(e_1|\,Top)$	1815, 1853, 1903	1853	1846, 1869, 1891	1853	1853
$D(e_2|\,G/Y)$	1885, 1901	1885, 1901	1883, 1899	1883, 1899	1883, 1899
$D(e_2|\,T/Y)$	1869, 1885, 1894, 1903	1869, 1885, 1894, 1903	1869, 1885, 1895, 1904	1869, 1885, 1895, 1904	1869, 1885, 1903
$D(e_2|\,T^d/T^{in})$	None	None	1869, 1885, 1901	1869, 1885, 1901	1869, 1885, 1901
$D(e_2|\,Top)$	1869, 1885, 1900	1831, 1869, 1885	1831, 1863, 1885	1831, 1863, 1885	1853, 1885

Note: The table reports the years in which there are (statistical) break points in conditional distribution of the fiscal series conditional on franchise series (panel A) and franchise series conditional on the fiscal series (panel B), respectively. We perform five varieties of Bai and Perron tests in Eviews 9. Details are explained in Supplementary Appendix A2.

Table A9: Direction of Causality Based on the Patterns of Structural Break Points: Filtered with War Dummies only

Franchise	Fiscal	$e \perp f$	$e \leftrightarrow f$	$e \rightarrow f$	$f \rightarrow e$
Test A					
e_1	T^d/T^{in}	1883-87			
e_2	T^d/T^{in}				1866-70, 1883-87
e_1	G/Y				1883-87
e_2	G/Y				1883-87
e_1	T/Y				1866-70, 1883-87
e_2	T/Y	1883-87			
e_1	Top				
e_2	Top	1830-34, 1866-70			
		1883-87			
Test B					
e_1	T^d/T^{in}	1853-57		1894-00	
e_2	T^d/T^{in}	1904-08			
e_1	G/Y				
e_2	G/Y				
e_1	T/Y			1853-57	
e_2	T/Y			1894-00	
e_1	Top				
e_2	Top				

Note: Based on test A and B from Table 2, the Table reports the years in which it is possible to draw a causal conclusion based on the structural break test result reported in Table A7 and A8 and the historical narrative analysis summarized in Table 3. Test A requires that there is an intervention in the franchise series according to the historical narrative in the years with statistical breaks. Test B requires that there is an intervention in the fiscal series according to the historical narrative in the years with statistical breaks. $\perp$ means independent, $\leftrightarrow$ means causality in both directions, and $\rightarrow$ means direction of causality. For test A, the years 1830-34 are the 1st reform act, 1866-70 are the 2nd reform act, 1883-87 are the 3rd reform act. For test B, the years 1853-57 are the beginning of the Gladstone's fiscal constitution, 1894-1900 is the end of the Gladstone's fiscal constitution, and 1904-08 is Asquith's budget. We allow for plus/minus two years around the event identified in the narrative analysis.

Table A10: Direction of Causality Based on the Patterns of Structural Break Points: Results with longer time lags (two parliaments plus 2 years).

Franchise	Fiscal	Years with $e \perp f$	$e \leftrightarrow f$	$e \rightarrow f$	$f \rightarrow e$
Test A					
e_1	T^d/T^{in}		(1866-76)[a]		1883-88
e_2	T^d/T^{in}				
e_1	G/Y			(1866-76)[a], 1883-88	
e_2	G/Y				
e_1	T/Y		(1866-76)[a]		1883-88
e_2	T/Y				
e_1	Top		1883-88, (1866-76)[a]		
e_2	Top				
Test B					
e_1	T^d/T^{in}	1807-11			
e_2	T^d/T^{in}				
e_1	G/Y				
e_2	G/Y				
e_1	T/Y	1853-57			
e_2	T/Y	1844-48, 1894-00		1853-57	
e_1	Top	1894-00		(1894-00)[b]	
e_2	Top	1894-00			

Note: The results reported in this Table assumes that the intervention intervals for e is two parliaments plus two years. The second election after the three reform acts were held in 1835, 1874 and 1886, respectively, so the intervals are 1830-37, 1866-76, and 1883-88. All data filtered with War Dummies and GDP per capita. Based on Test A and B from Table A6, the table reports the years in which it is possible to draw a causal conclusion based on the structural break test result reported in Table A4 and A5 and the historical narrative analysis. Test A requires that there is an intervention in the franchise series according to the historical narrative in the years with statistical breaks. Test B requires that there is an intervention in the fiscal series according to the historical narrative in the years with statistical breaks. $\perp$ means independent, $\leftrightarrow$ means causality in both directions, and $\rightarrow$ means direction of causality. For test A, the years 1883-88 are the 3rd reform act and the years 1866-76 are the Second Reform Act. For test B, the years 1844-48 are the repeal of the corn laws, 1853-57 are the beginning of the Gladstone's fiscal constitution, 1894-1900 is the end of the Gladstone's fiscal constitution, and 1904-08 is Asquith's budget. a. One break only in $D(e_1)$ in this period. b. One break only in $D(e_1|Top)$ in this period.