

Appendix to:

“Constraints on the executive and tax revenues in the long run”

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This is supplementary material to the article published in the Journal of Institutional Economics. It was uploaded to the webpage of the [working paper version](#) on 23 November 2022.

This document reports additional material (variables definitions, descriptive statistics, and further results) related to sections 3, 4 and 5 of “Constraints on the executive and tax revenues in the long run”.

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A1. Extra material for section 3

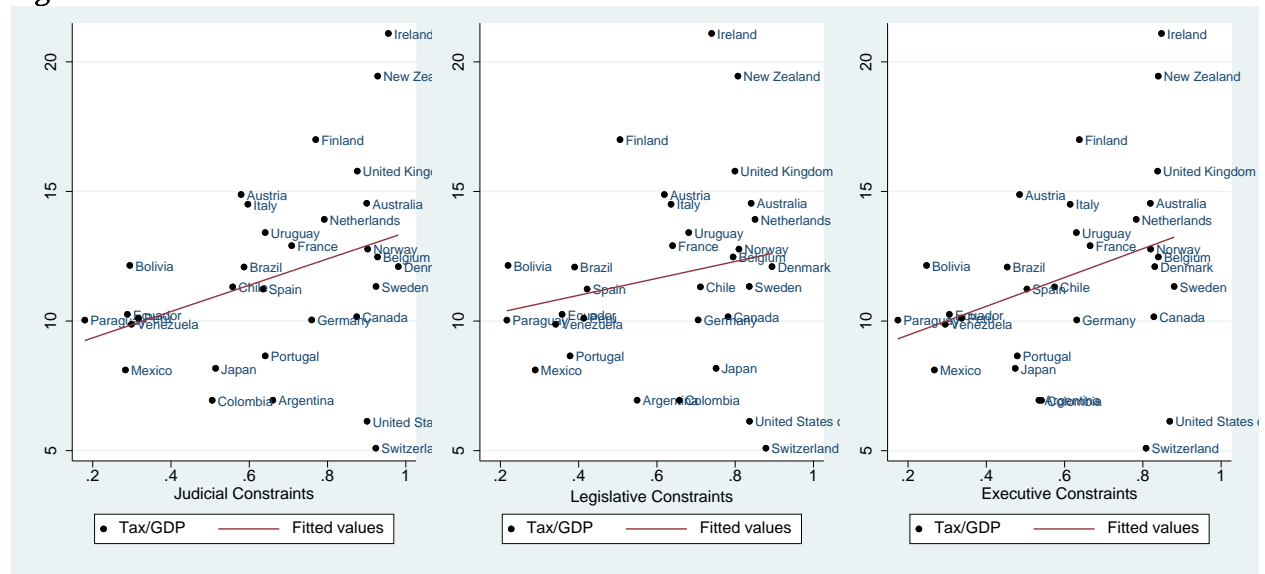
A1.1 Description of the V-Dem variables on executive constraints

Table A1: V-Dem variables

Variable name	Definition	Source
Legislative constraints	<p>Question: “To what extent are the legislature and government agencies e.g., comptroller general, general prosecutor, or ombudsman capable of questioning, investigating, and exercising oversight over the executive?”</p> <p>Aggregation: The index is formed by taking the point estimates from a Bayesian factor analysis model of the indicators for: legislature questions officials in practice, <i>v2lgstexp</i>; executive oversight, <i>v2lgotovst</i>; legislature investigates in practice, <i>v2lginvstp</i>; and legislature opposition parties, <i>v2lgoppart</i>.</p> <ul style="list-style-type: none"> - <i>v2lgstexp</i>: Legislature questions officials in practice. In practice, does the legislature routinely question executive branch officials? - <i>v2lgotovst</i>: Executive oversight. If executive branch officials were engaged in unconstitutional, illegal, or unethical activity, how likely is it that a body other than the legislature, such as a comptroller general, general prosecutor, or ombudsman, would question or investigate them and issue an unfavorable decision or report? - <i>v2lginvstp</i>: Legislature investigates in practice. If the executive were engaged in unconstitutional, illegal, or unethical activity, how likely is it that a legislative body (perhaps a whole chamber, perhaps a committee, whether aligned with government or opposition) would conduct an investigation that would result in a decision or report that is unfavorable to the executive? - <i>v2lgoppart</i>: Legislature opposition parties. Are opposition parties (those not in the ruling party or coalition) able to exercise oversight and investigatory functions against the wishes of the governing party or coalition? 	Coppedge et al. 2020
Judicial constraints	<p>Question: “To what extent does the executive respect the constitution and comply with court rulings, and to what extent is the judiciary able to act in an independent fashion?”</p> <p>Aggregation: The index is formed by taking the point estimates from a Bayesian factor analysis model of the indicators for: executive respects constitution, <i>v2exrescon</i>; compliance with judiciary, <i>v2jucomp</i>; compliance with high court, <i>v2jubccomp</i>; high court independence, <i>v2jubcind</i>; and lower court independence, <i>v2juncind</i>.</p> <ul style="list-style-type: none"> - <i>v2exrescon</i>: Executive respects constitution. Do members of the executive (the head of state, the head of government, and cabinet ministers) respect the constitution? - <i>v2jucomp</i>: Compliance with judiciary. How often would you say the government complies with important decisions by other courts with which it disagrees? - <i>v2jubccomp</i>: Compliance with high court. How often would you say the government complies with important decisions of the high court with which it disagrees? - <i>v2jubcind</i>: High court independence. When the high court in the judicial system is ruling in cases that are salient to the government, how often would you say that it makes decisions that merely reflect government wishes regardless of its sincere view of the legal record? - <i>v2juncind</i>: Lower court independence. When judges not on the high court are ruling in cases that are salient to the government, how often would you say that their decisions merely reflect government wishes regardless of their sincere view of the legal record? 	Coppedge et al. 2020
Executive constraints	The arithmetic mean of <i>legislative</i> and <i>judicial constraints</i> on the executive.	Coppedge et al. 2020

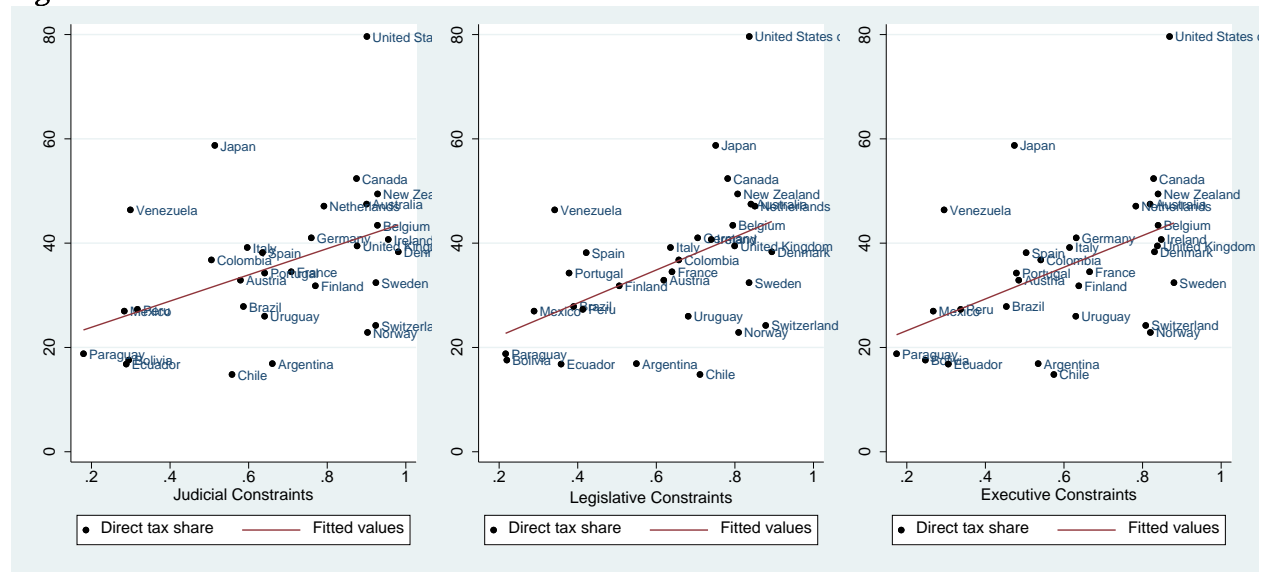
A1.2 Executive constraints and taxation: correlations and trends

Figure A1: Taxation and Executive Constraints



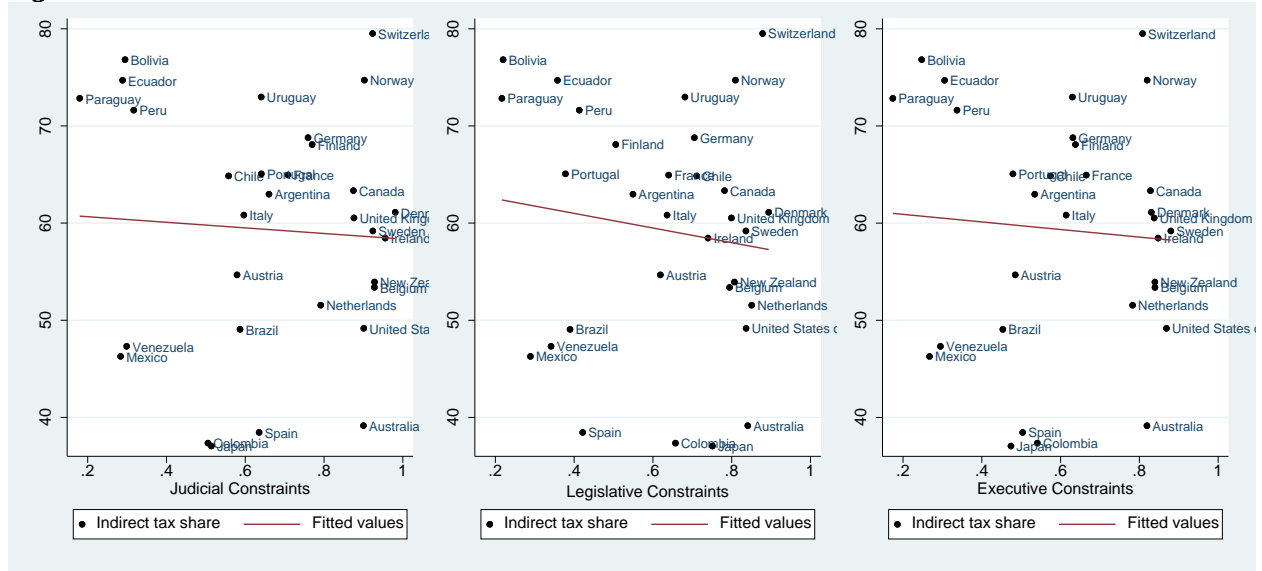
Notes: the Y-axis variable is the *Total central government tax revenues as a share of GDP* (see Andersson and Brambor 2019).

Figure A2: Share of Direct Taxes and Executive Constraints



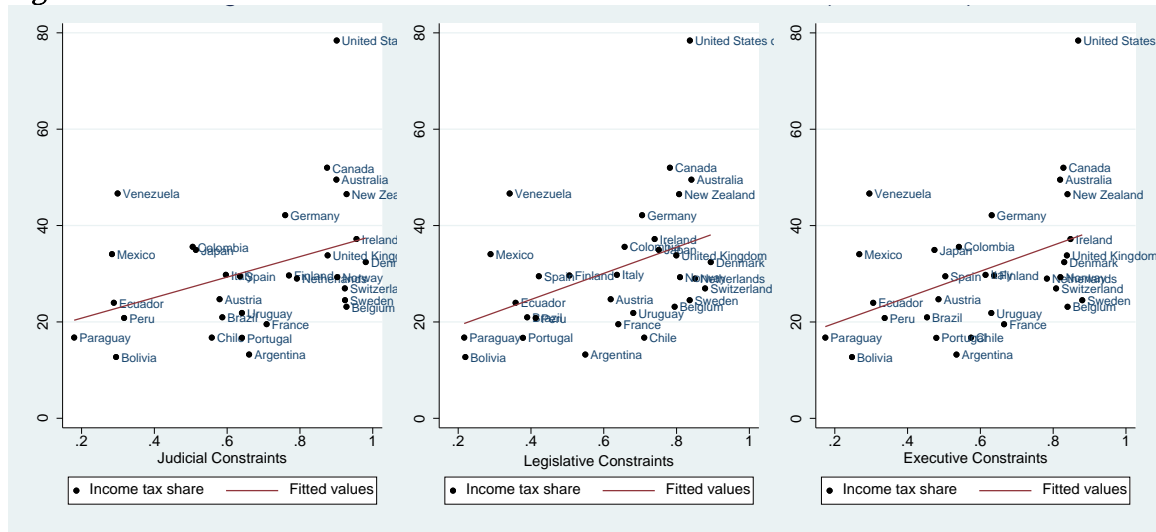
Notes: the Y-axis variable is the *Share of total central government tax revenue from direct taxes*. A direct tax is imposed directly upon an individual person (legal or natural) or property. Direct taxes include taxes on income, property, and other direct taxes (see Andersson and Brambor 2019).

Figure A3: Share of Indirect Taxes and Executive Constraints



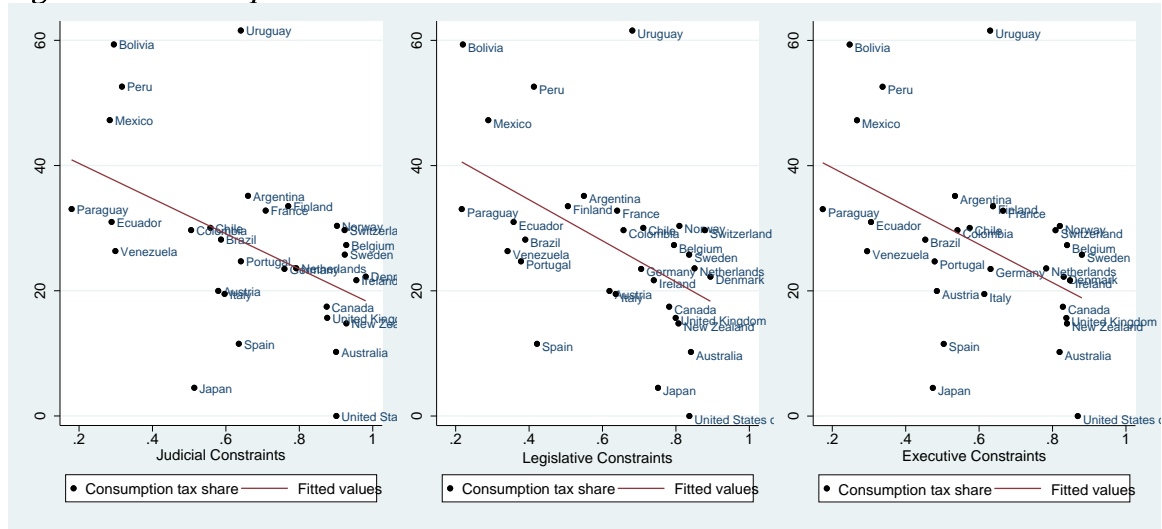
Notes: the Y-axis variable is the *Share of total tax revenue from indirect taxes*. An indirect tax is a tax on type of transaction, for example sales or importing goods. Indirect taxes include excises, customs, consumption taxes, and other indirect taxes (see Andersson and Brambor 2019).

Figure A4: Income Taxation and Executive Constraints



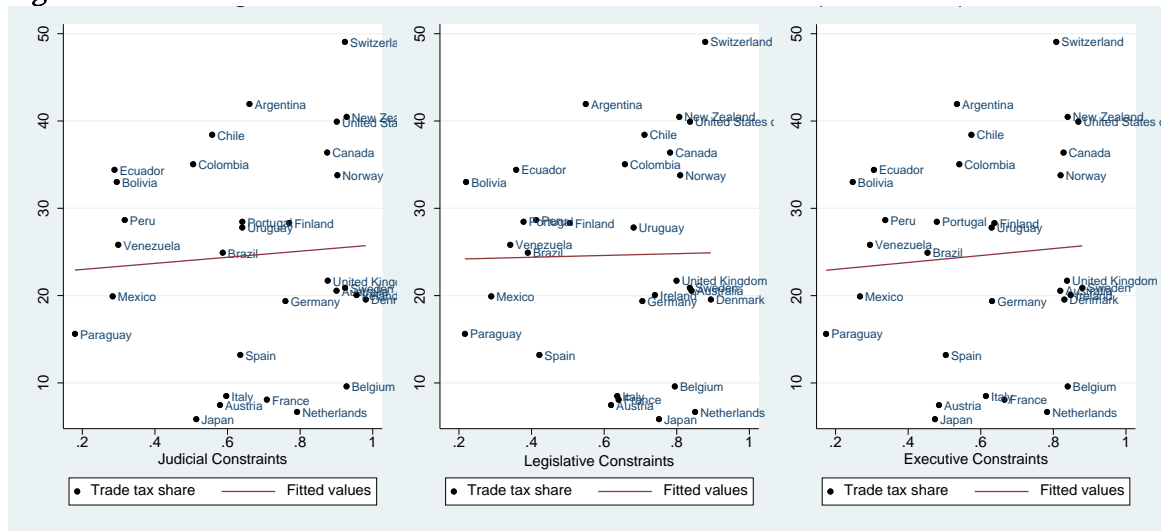
Notes: the Y-axis variable is the *Share of total central government tax revenue from income taxes*. These include taxes on (i) income, profits, and capital gains by individuals, (ii) income, profits, and capital gains by corporations and other enterprises, and (iii) taxes on payroll and workforce (see Andersson and Brambor 2019).

Figure A5: Consumption Taxation and Executive Constraints



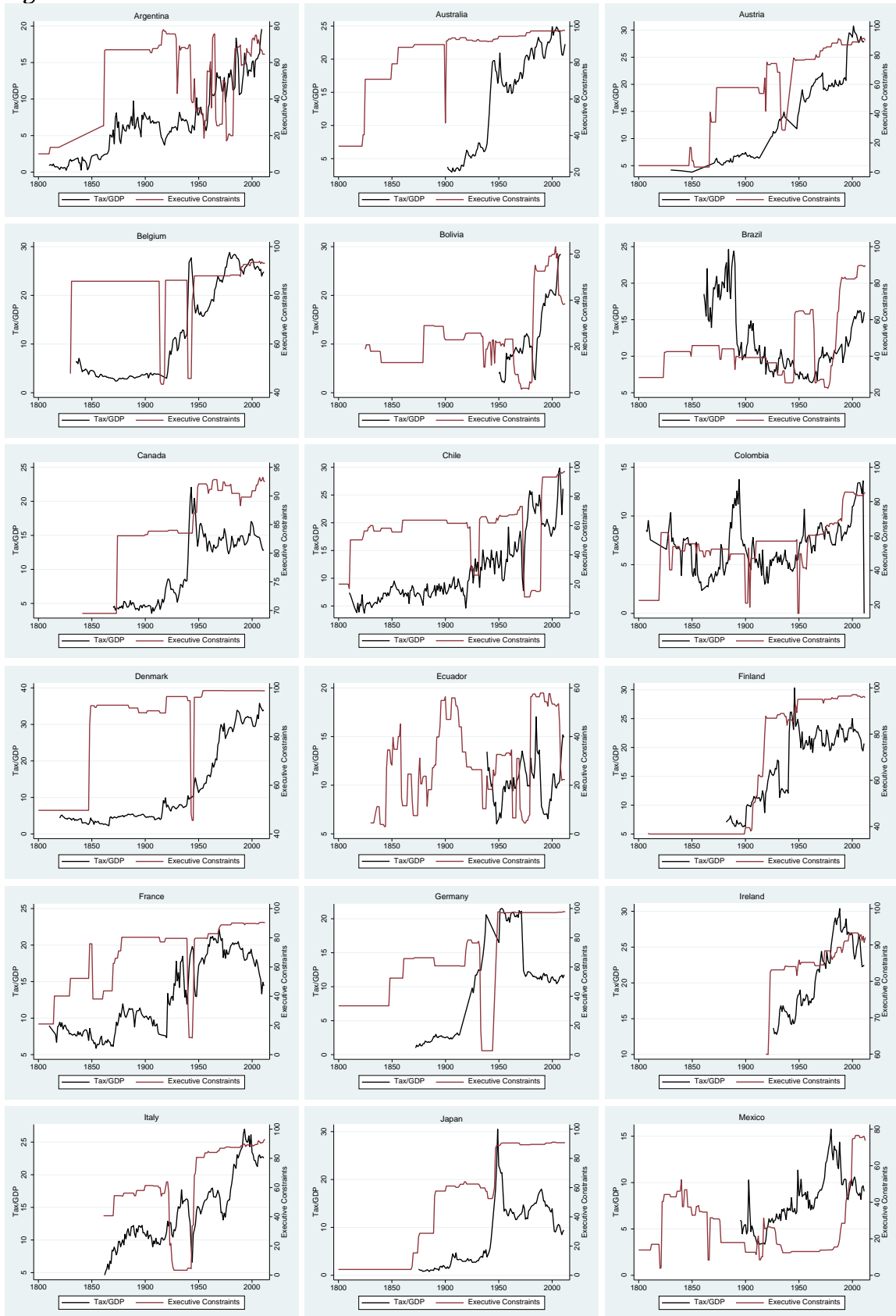
Notes: the Y-axis variable is the *Share of total tax revenue from consumption taxes*. This category includes levies on value-added taxes, sales taxes, and turnover and other general taxes on goods and services (see Andersson and Brambor 2019).

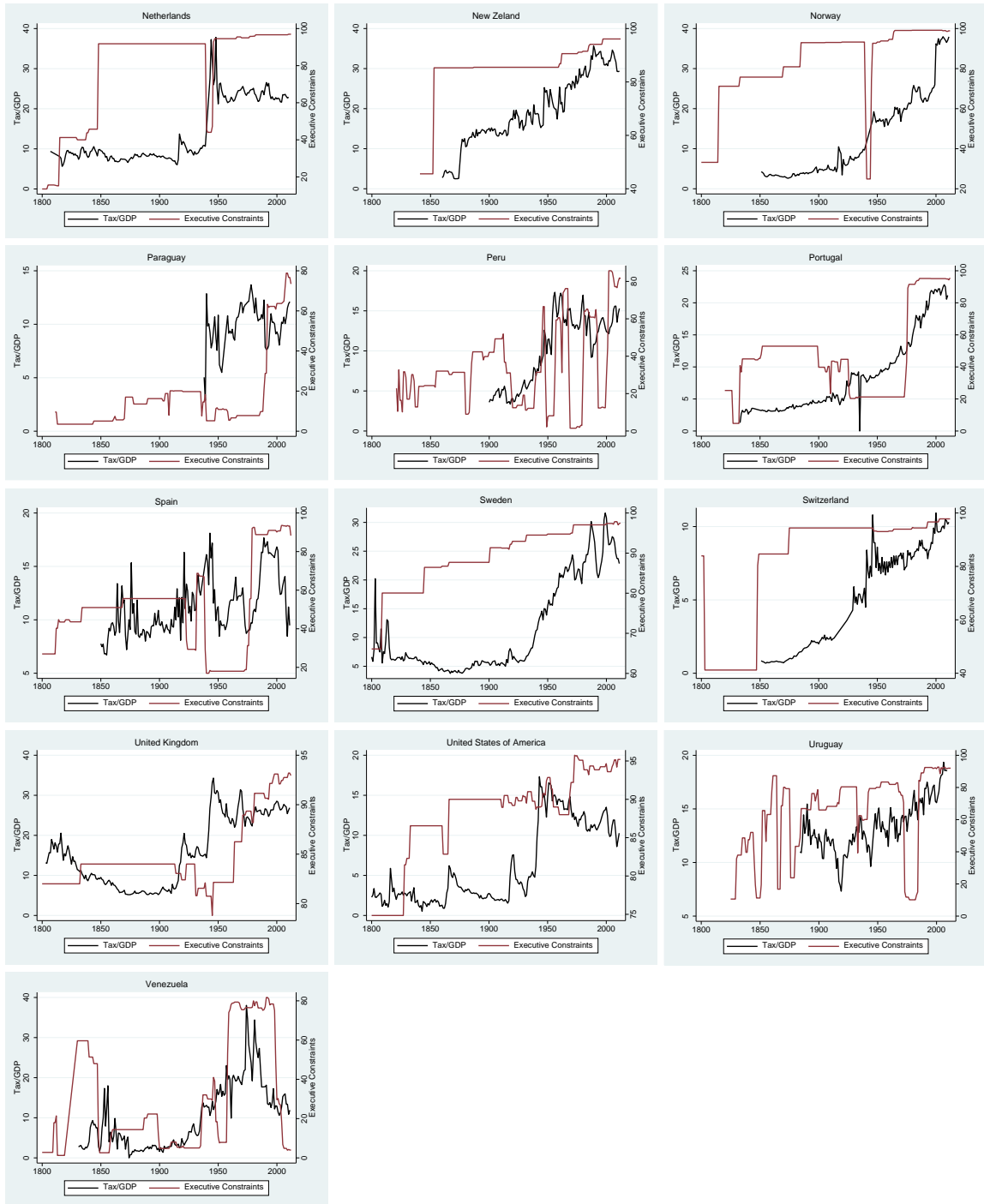
Figure A6: Trade Taxation and Executive Constraints



Notes: the Y-axis variable is the *Share of total tax revenue from customs and taxes on international trade*. Customs are the international pendant to excises in that they tax the flow of goods across a country's borders. The measure of customs includes (i) customs and other import duties, (ii) taxes on exports, (iii) taxes on profits of export or import monopolies, (iv) exchange profits, (v) exchange taxes, and (vi) other taxes on international trade and transactions (see Andersson and Brambor 2019).

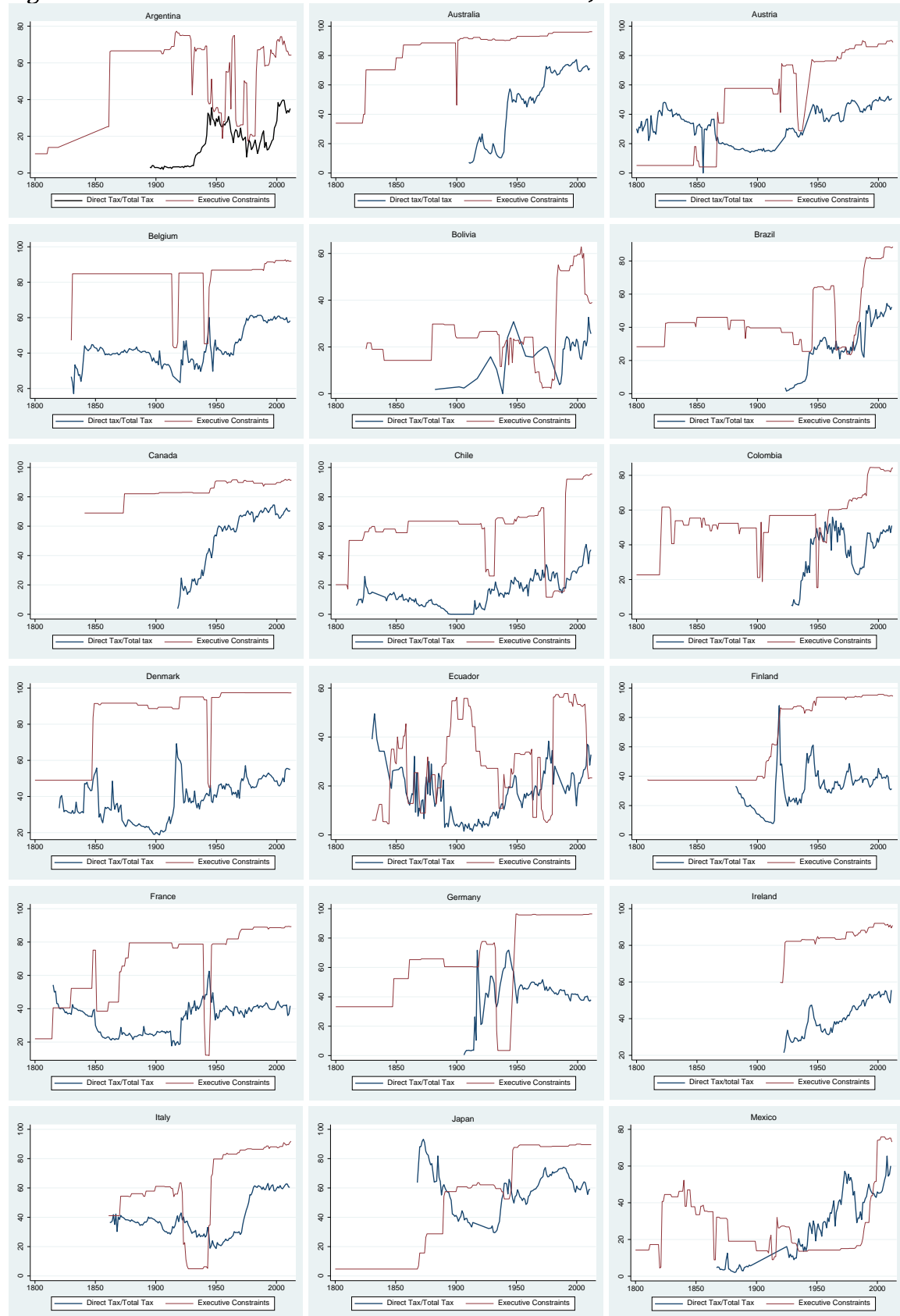
Figure A7 – Taxation and executive constraints: 1800-2012

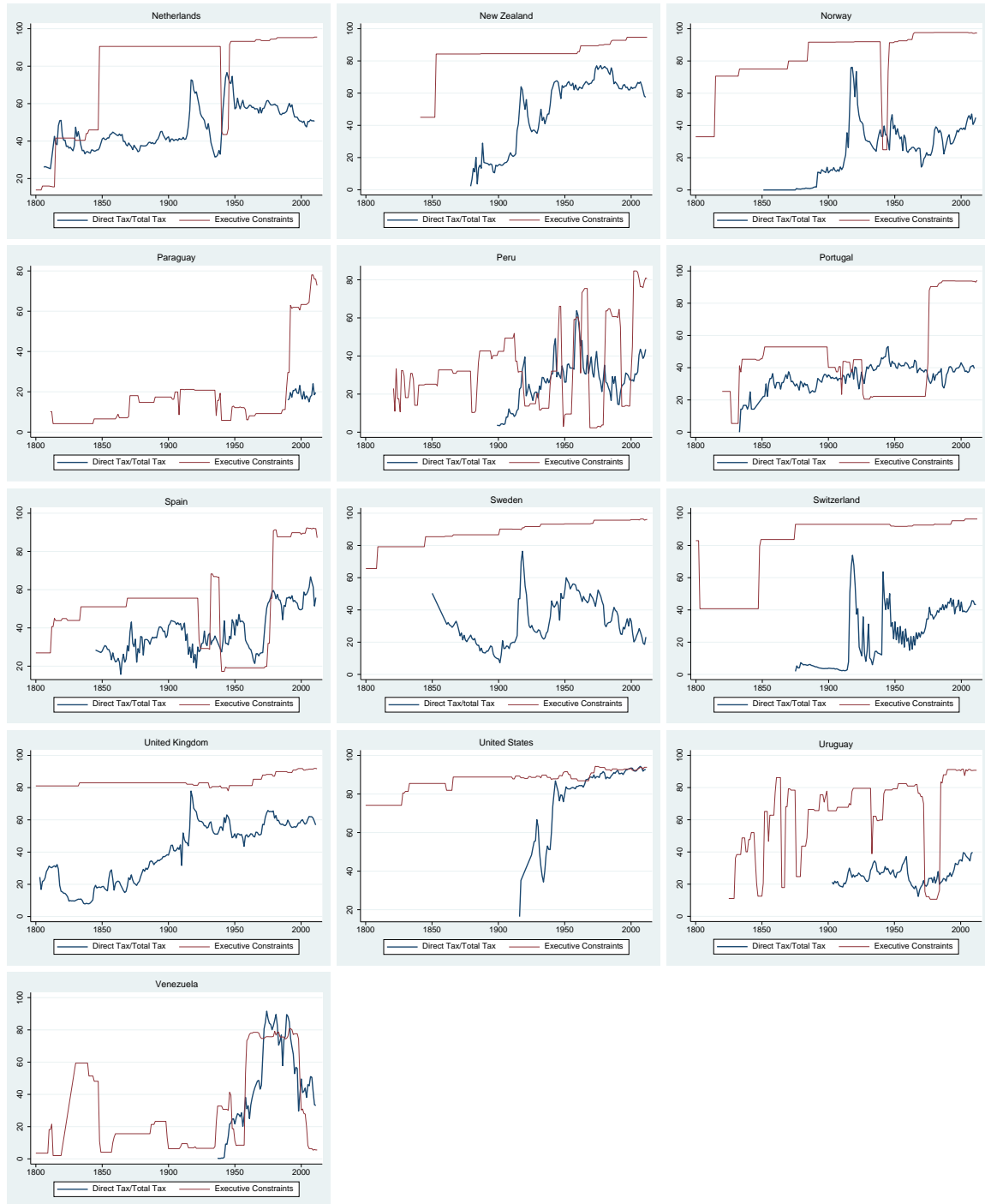




Notes: the left-hand side vertical axis variable is the *Share of total central government tax revenues as a share of GDP*. The right-hand side vertical axis variable is *Executive Constraints* (arithmetic mean of judicial and legislative constraints).

Figure A8: Share of Direct Taxes and Executive Constraints, 1800-2012



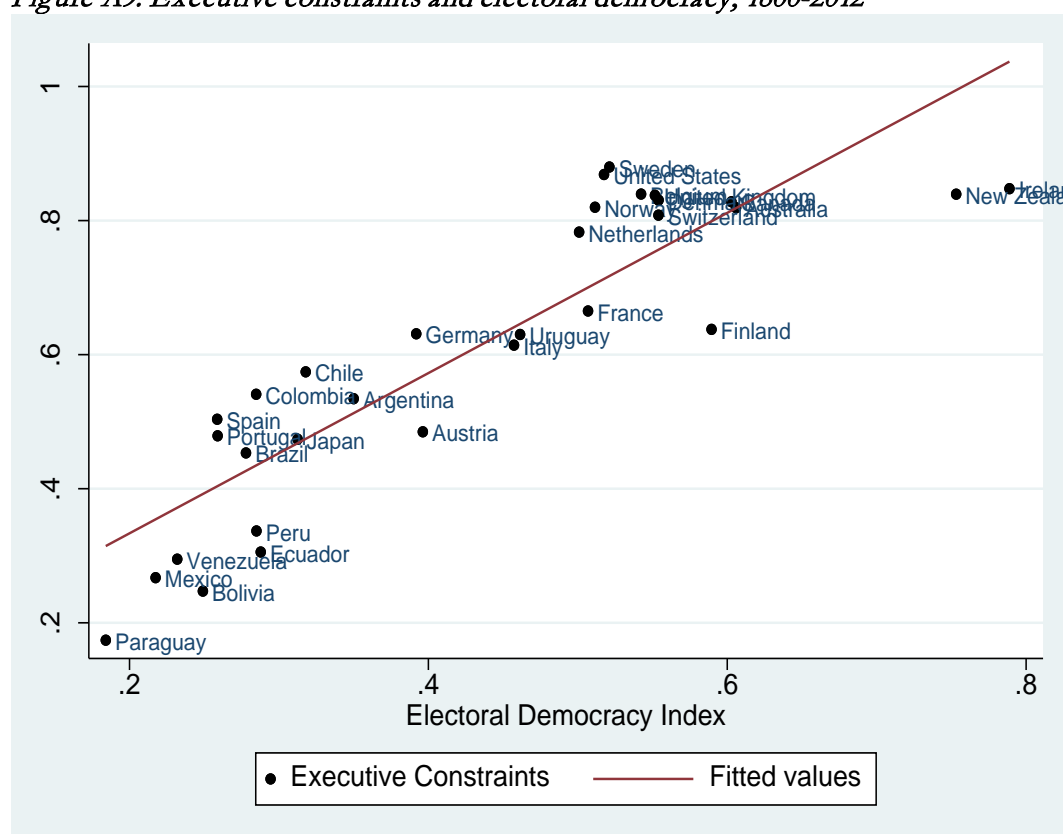


Notes: the left-hand side vertical axis variable is the *Share of total central government tax revenue from direct taxes*. Direct taxes include taxes on income, property, and other direct taxes. The right-hand side vertical axis variable is Executive Constraints (arithmetic mean of judicial and legislative constraints).

A1.3 Executive constraints and electoral democracy

Executive constraints levels can vary significantly in countries at the same level of democracy, even in our sample of 31 countries. Figure A9 reports measure of executive constraints and the V-Dem's *Electoral democracy index*, averaged over the whole period. Compare France and Sweden, or Colombia and Chile with Peru and Ecuador. These are examples of countries where, for similar democracy levels, we observe significant variation in their levels of executive constraints, hence suggesting that regime types and executive constraints may have distinct explanatory power with respect to tax revenues.

Figure A9: Executive constraints and electoral democracy, 1800-2012



Notes: the vertical axis variable is Executive Constraints (arithmetic mean of judicial and legislative constraints). The horizontal axis variable is V-Dem's Electoral Democracy index, $v2x_polyarchy$, (Coppedge et al. 2020). They are averages of the available values for the 1800-2012 period.

A2. Extra material for section 4

A2.1 Cross-section dependence and stationarity tests

We apply the Pesaran (2015) test to investigate cross-section correlation properties in the data and report the CD statistic (as well as its corresponding p -value). The CD statistic is normally distributed and the null hypothesis of the test is weak cross-section independence against the alternative hypothesis of weak cross-section dependence. The results, presented in Table A3, point to pervasive cross-section dependence across different variable specifications (levels versus first differences). The CD statistics are considerably lower for variables in first differences.

Table A3: Cross-section dependence

Panel A		Variables in Levels						
	Direct Tax	Indirect Tax	Consumption Tax	Trade Tax	Tax/GDP	Judicial Constraints	Legislative Constraints	Executive Constraints
CD	138.72	105.27	129.66	60.32	178.74	133.49	142.34	159.17
p -value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Panel B		Variables in First Differences						
	Direct Tax	Indirect Tax	Consumption Tax	Trade Tax	Tax/GDP	Judicial Constraints	Legislative Constraints	Executive Constraints
CD	9.18	15.25	0.24	17.61	4.69	5.36	2.07	8.58
p -value	0.000	0.000	0.813	0.000	0.000	0.000	0.039	0.000

Notes: (i) We use the stata routine ‘xtcd2’ developed by Ditzgen (2018). CD is the Pesaran (2015) test for cross-section dependence distributed $N(0, 1)$ under the null of cross-section independence. Panels A and B test for cross-section dependence in the variable series for levels and first differences, respectively. Direct tax share, indirect tax share, consumption tax share, trade tax share, tax/GDP ratio, judicial constraints, legislative constraints and executive constraints all in logs.

Cross-section dependence results in over-rejection of the null hypothesis of non-stationarity in standard panel unit roots tests (Pesaran 2007). Thus, we employ a panel unit root test, the ‘CIPS’ test, which allows for cross-section correlation. Panel unit root tests are applied to the variable series following the procedure in Pesaran (2007). The test is based on a standard Augmented Dickey-Fuller (ADF) regression, augmented with cross-section averages of the dependent and independent variables to account for cross-section dependence. We report the Zt bar statistic (and its associated p -value) for the null hypothesis of non-stationarity in all countries’ variable series against the alternative hypothesis of stationarity in some countries’ variable series. For variables in levels, non-stationarity cannot be rejected once the ADF equation is augmented with a sufficient number of lags and/or a linear trend (Tables A4 and A5). Non-stationarity is rejected for all variables in first differences.

Table A4: Panel Unit Roots Tests: Taxation

Levels: CIPS test with intercept only										
Variable	Tax/GDP		Direct Tax		Indirect Tax		Consumption Tax		Trade Tax	
Lags	Ztbar	p	Ztbar	p	Ztbar	p	Ztbar	p	Ztbar	p
0	-9.53	0.00	-10.13	0.00	-6.54	0.00	-7.05	0.00	-0.19	0.43
1	-6.81	0.00	-7.65	0.00	-4.76	0.00	-4.25	0.05	-1.08	0.14
2	-4.45	0.00	-5.82	0.00	-2.68	0.02	-0.55	0.29	0.31	0.62
3	-4.42	0.00	-3.74	0.02	0.80	0.79	0.07	0.53	1.77	0.96
4	-3.20	0.00	-4.03	0.00	0.77	0.78	1.15	0.88	0.61	0.73
5	-2.42	0.01	-4.78	0.00	1.54	0.94	2.27	0.99	2.27	0.99
6	-2.32	0.01	-1.40	0.08	2.33	0.99	4.88	1.00	2.98	0.999
Levels: CIPS test with intercept & trend										
Variable	Tax/GDP		Direct Tax		Indirect Tax		Consumption Tax		Trade Tax	
Lags	Ztbar	p	Ztbar	p	Ztbar	p	Ztbar	p	Ztbar	p
0	-8.14	0.00	-9.97	0.00	-5.15	0.00	-4.33	0.00	1.58	0.94
1	-4.84	0.00	-7.21	0.01	-2.91	0.00	-1.76	0.04	0.49	0.69
2	-2.60	0.00	-4.64	0.00	-1.06	0.14	1.44	0.92	2.44	0.99
3	-2.04	0.02	-2.50	0.01	2.47	0.97	2.11	0.98	3.95	1.00
4	-0.99	0.16	-2.59	0.01	2.48	0.98	3.89	1.00	2.91	0.998
5	0.21	0.59	-3.54	0.00	2.89	0.998	4.75	1.00	5.00	1.00
6	0.53	0.70	0.06	0.52	4.03	1.00	7.64	1.00	4.91	1.00
Differences: CIPS test with drift										
Variable	Tax/GDP		Direct Tax		Indirect Tax		Consumption Tax		Trade Tax	
Lags	Ztbar	p	Ztbar	p	Ztbar	p	Ztbar	p	Ztbar	p
0	-26.86	0.00	-25.98	0.00	-26.09	0.00	-23.73	0.00	-26.79	0.00
1	-26.49	0.00	-25.16	0.00	-26.01	0.00	-20.30	0.00	-25.78	0.00
2	-25.15	0.00	-23.38	0.00	-25.49	0.00	-16.67	0.00	-24.15	0.00
3	-24.11	0.00	-21.32	0.00	-23.48	0.00	-12.27	0.00	-21.66	0.00
4	-22.02	0.00	-16.46	0.00	-21.20	0.00	-9.08	0.00	-20.59	0.00
5	-20.00	0.00	-14.15	0.00	-18.26	0.00	-7.19	0.00	-17.12	0.00
6	-17.58	0.00	-12.27	0.00	-14.69	0.00	-6.06	0.00	-13.63	0.00

Notes: Tax/GDP = central tax-to-GDP ratio, Direct Tax = Direct Tax/Total Central Tax, Indirect Tax = Indirect Tax/Total Central Tax, Consumption Tax = Consumption Tax/Total Central Tax, Trade Tax = Trade Tax/Total Central Tax. Variables are from Andersson and Brambor (2019).

Table A5: Panel Unit Roots Tests: Constraints on the Executive

Levels: CIPS test with intercept only						
Variables	Judicial Constraints		Legislative Constraints		Executive Constraints	
Lags	$Ztbar$	p	$Ztbar$	p	$Ztbar$	p
0	-3.24	0.00	-3.54	0.00	6.62	1.00
1	-4.39	0.00	-2.82	0.00	7.03	1.00
2	-3.86	0.00	-3.10	0.00	7.17	1.00
3	-4.06	0.00	-2.13	0.02	7.38	1.00
4	-2.89	0.00	-1.25	0.11	7.15	1.00
5	-2.76	0.00	-1.39	0.08	6.76	1.00
6	-2.29	0.01	-1.48	0.07	7.16	1.00
Levels: CIPS test with intercept & trend						
Variables	Judicial Constraints		Legislative Constraints		Executive Constraints	
Lags	$Ztbar$	p	$Ztbar$	p	$Ztbar$	p
0	-0.48	0.32	-1.88	0.03	8.31	1.00
1	-1.86	0.03	-1.51	0.07	8.63	1.00
2	-1.13	0.13	-2.21	0.01	8.43	1.00
3	-1.16	0.12	-0.75	0.23	8.41	1.00
4	-0.29	0.39	0.05	0.52	8.00	1.00
5	-0.24	0.41	-0.21	0.42	7.50	1.00
6	0.19	0.57	-0.33	0.37	7.75	1.00
Differences: CIPS test with drift						
Variables	Judicial Constraints		Legislative Constraints		Executive Constraints	
Lags	$Ztbar$	p	$Ztbar$	p	$Ztbar$	p
0	-26.91	0.00	-26.91	0.00	-11.28	0.00
1	-26.91	0.00	-26.72	0.00	-11.28	0.00
2	-26.78	0.00	-25.83	0.00	-11.00	0.00
3	-26.46	0.00	-24.20	0.00	-10.35	0.00
4	-25.01	0.00	-21.38	0.00	-8.49	0.00
5	-23.22	0.00	-18.48	0.00	-7.25	0.00
6	-21.45	0.00	-16.29	0.00	-5.42	0.00

Notes: Data on Judicial and Legislative Constraints are from the V-Dem Dataset (Coppedge et al. 2020).

A2.2 Empirical Strategy: further details on CCEMG estimation

Here we provide further details on the CCEMG approach based on Pesaran (2006) and extended in Chudik and Pesaran (2015). The objective in equation (3) is to identify the unobserved common factors f_t by including the cross-section averages of potential determinants of tax shares is appropriate. In this setup,

$$\sum_{l=0}^p \pi_{7i}^{CA} \overline{\Delta Y}_{t-p}$$

where the π_s and Φ_s represent the long-run and short-run coefficients respectively, the π_s^{CA} represent the coefficients on the cross-section averages of the dependent and independent variables (all coefficients yielding the standard CCEMG estimator). The $\sum_{l=1}^p \pi_s^{CA}$ represent the coefficients on the additional lags of cross-section averages which Chudik and Pesaran (2015) suggest being added to the standard CCEMG estimator (yielding the dynamic CCEMG estimator) and Y represents further covariates included in the model. As a rule of thumb, the lags of the cross-section averages to be added to the standard model are chosen by $p = \sqrt[3]{T}$ (Chudik and Pesaran, 2015). From the terms in levels (π_i^{CV}), we can obtain the long-run coefficients, $\beta_i^{CV} = -\frac{\pi_i^{CV}}{\pi_i^{EC}}$, whereas the regression coefficients on the terms in first differences capture the short-run (transitory) effects and can be read off directly from estimation.

A3. Extra material for section 5

A3.1 Cointegration tests: income, consumption and trade taxes

Table A6: Gengenbach, Urbain and Westerlund (2009) Cointegration Test: tax shares and executive constraints

	Test Statistic, $\bar{\tau}^*$	10%	5%	1%
Panel A – Executive Constraints				
<i>Income tax share and executive constraints</i>				
Model 1	-2.515***	-1.995	-2.065	-2.190
Model 2	-2.721***	-2.458	-2.517	-2.611
Model 3	-2.856	-2.875	-2.925	-3.010
<i>Consumption tax share and executive constraints</i>				
Model 1	-2.632***	-1.995	-2.065	-2.190
Model 2	-2.859***	-2.458	-2.517	-2.611
Model 3	-2.911*	-2.875	-2.925	-3.010
<i>Trade tax share and executive constraints</i>				
Model 1	-1.898***	-1.995	-2.065	-2.190
Model 2	-2.199***	-2.458	-2.517	-2.611
Model 3	-2.911*	-2.875	-2.925	-3.010
Panel B – Judicial Constraints				
<i>Income tax share and judicial constraints</i>				
Model 1	-2.474***	-1.995	-2.065	-2.190
Model 2	-2.700***	-2.458	-2.517	-2.611
Model 3	-2.892*	-2.875	-2.925	-3.010
<i>Consumption tax share and judicial constraints</i>				
Model 1	-2.800***	-1.995	-2.065	-2.190
Model 2	-3.015***	-2.458	-2.517	-2.611
Model 3	-3.118***	-2.875	-2.925	-3.010
<i>Trade tax share and judicial constraints</i>				
Model 1	-1.842	-1.995	-2.065	-2.190
Model 2	-2.916	-2.458	-2.517	-2.611
Model 3	-2.180	-2.875	-2.925	-3.010
Panel C – Legislative Constraints				
<i>Income tax share and legislative constraints</i>				
Model 1	-2.603***	-1.995	-2.065	-2.190
Model 2	-2.840***	-2.458	-2.517	-2.611
Model 3	-2.989**	-2.875	-2.925	-3.010
<i>Consumption tax share and legislative constraints</i>				
Model 1	-2.693***	-1.995	-2.065	-2.190
Model 2	-3.092***	-2.458	-2.517	-2.611
Model 3	-3.190***	-2.875	-2.925	-3.010
<i>Trade tax share and legislative constraints</i>				
Model 1	-2.013*	-1.995	-2.065	-2.190
Model 2	-2.394	-2.458	-2.517	-2.611
Model 3	-2.713	-2.875	-2.925	-3.010

Note: ***, **, * indicate significance at 1 percent, 5 percent and 10 percent, respectively. Significance will indicate rejection of the null hypothesis. H_0 : no error correction, hence, no cointegration, H_1 : error correction, hence cointegration. Model 1 – 3 refers to an ECM without any deterministic terms, with intercept and with intercept and trend, respectively.

A3.2 Short- and long-run effects: income, consumption and trade taxes

Table A7: ECM estimates: shares of income, consumption and trade Taxes

<i>Panel A: Income Taxes/Total Taxes and Executive Constraints</i>			
	<i>Judicial</i>	<i>Legislative</i>	<i>Exec. constraints</i>
<i>Long-Run</i>			
Executive Constraints	0.259 [0.234]	0.432** [0.202]	0.561** [0.222]
<i>Short-Run</i>			
Executive Constraints	-0.076 [0.063]	0.062 [0.089]	-0.034 [0.047]
<i>EC Coefficient</i>			
Y_{it-1}	-0.169*** [0.022]	-0.183*** [0.026]	-0.149*** [0.019]
<i>t</i> -statistic	-7.69	-6.96	-7.95
<i>CD</i> test	-3.102	-2.410	-3.035
(<i>p</i> -value)	(0.002)	(0.016)	(0.002)
Observations (<i>N</i>)	3239 (31)	2999 (31)	3239 (31)
<i>Panel B: Consumption Taxes/Total Taxes and Executive Constraints</i>			
	<i>Judicial</i>	<i>Legislative</i>	<i>Exec. constraints</i>
<i>Long-Run</i>			
Executive Constraints	0.301 [0.248]	0.328 [0.470]	0.146 [0.105]
<i>Short-Run</i>			
Executive Constraints	0.097 [0.071]	0.022 [0.159]	-0.037 [0.084]
<i>EC Coefficient</i>			
Y_{it-1}	-0.301*** [0.052]	-0.328*** [0.051]	-0.293*** [0.048]
<i>t</i> -statistic	-5.77	-6.45	-6.09
<i>CD</i> test	-2.390	-1.555	-2.015
(<i>p</i> -value)	(0.017)	(0.120)	(0.044)
Observations (<i>N</i>)	2065 (30)	1859 (30)	2065 (30)
<i>Panel C: Trade Taxes/Total Taxes and Executive Constraints</i>			
	<i>Judicial</i>	<i>Legislative</i>	<i>Exec. constraints</i>
<i>Long-Run</i>			
Executive Constraints	0.231 [0.580]	-0.574 [0.553]	-0.082 [0.317]
<i>Short-Run</i>			
Executive Constraints	0.175 [0.086]	0.033 [0.114]	0.126* [0.071]
<i>EC Coefficient</i>			
Y_{it-1}	-0.089*** [0.023]	-0.114*** [0.030]	-0.086*** [0.022]
<i>t</i> -statistic	-3.87	-3.76	-3.98
<i>CD</i> test	-3.185	-2.995	-3.503
(<i>p</i> -value)	(0.001)	(0.003)	(0.000)
Observations (<i>N</i>)	4026 (31)	3726 (31)	4026 (31)

Notes: *, **, *** indicate significance at 10%, 5% and 1% respectively.

A3.3 Error Correction Model: allowing for longer dynamics

The cointegration results in the article include one lag, following standard practice in time series analysis. We experiment here with including 2-to-4 lags, allowing for longer dynamics. Here we replicate ECM estimates when using three lags (the results are essentially the same when using 2 or 4 lags). The results confirm earlier estimates, i.e., positive but insignificant long-run effect on total taxes and share of direct taxes. However, the estimated (average) long-run effect for *legislative constraints on the executive* and the share of direct taxes is now significant. We also find that the estimated long-run effect on the share of total taxes from income tax is, again, significant.

Table A8: ECM estimates using 3 lags: total taxes, shares of direct and indirect taxes

<i>Panel A: Total Taxes/GDP and Executive Constraints</i>			
	<i>Judicial</i>	<i>Legislative</i>	<i>Exec. Constraints</i>
<i>Long-Run</i>			
Executive Constraints	0.069 [0.086]	0.115 [0.121]	0.022 [0.074]
<i>Short-Run</i>			
Executive Constraints	-0.077 [0.069]	-0.063 [0.074]	0.001 [0.051]
<i>EC Coefficient</i>			
Y_{it-1}	-0.148*** [0.015]	-0.170*** [0.018]	-0.151*** [0.016]
<i>t</i> -statistic	-9.62	-9.24	-9.35
<i>CD</i> test	-3.139	-2.209	-2.770
(<i>p</i> -value)	(0.002)	(0.027)	(0.006)
Observations (<i>N</i>)	4457 (31)	4178 (31)	4457 (31)
<i>Panel B: Share of Direct Taxes and Executive Constraints</i>			
	<i>Judicial</i>	<i>Legislative</i>	<i>Exec. Constraints</i>
<i>Long-Run</i>			
Executive Constraints	0.035 [0.252]	0.365** [0.150]	0.080 [0.112]
<i>Short-Run</i>			
Executive Constraints	0.008 [0.038]	0.043 [0.055]	-0.017 [0.037]
<i>EC Coefficient</i>			
Y_{it-1}	-0.186*** [0.022]	-0.200*** [0.025]	-0.182*** [0.022]
<i>t</i> -statistic	-8.17	-8.03	-8.26
<i>CD</i> test	-1.694	-0.985	-1.890
(<i>p</i> -value)	(0.090)	(0.325)	(0.059)
Observations (<i>N</i>)	3909 (31)	3575 (31)	3909 (31)
<i>Panel C: Share of Indirect Taxes and Executive Constraints</i>			
	<i>Judicial</i>	<i>Legislative</i>	<i>Exec. Constraints</i>
<i>Long-Run</i>			
Executive Constraints	-0.034 [0.219]	-0.059 [0.096]	0.049 [0.093]
<i>Short-Run</i>			
Executive Constraints	-0.015 [0.035]	-0.026 [0.037]	0.017 [0.026]
<i>EC Coefficient</i>			
Y_{it-1}	-0.103*** [0.013]	-0.111*** [0.016]	-0.108*** [0.015]
<i>t</i> -statistic	-7.75	-6.86	-7.35
<i>CD</i> test	-3.878	-3.077	-3.950
(<i>p</i> -value)	(0.000)	(0.002)	(0.000)
Observations (<i>N</i>)	4308 (31)	3994 (31)	4308 (31)

Notes: The long-run and short-run averages are reported, with standard errors reported in parentheses. *CD* test is the Pesaran (2015) test distributed $N(0,1)$ under the null of weak cross-section independence (*p*-value in parentheses below). *, **, *** indicate significance at 10%, 5% and 1% respectively.

Table A9: ECM estimates using 3 lags: shares of income, consumption and trade taxes

Panel A: Income taxes/total taxes and Executive Constraints			
	<i>Judicial</i>	<i>Legislative</i>	<i>Exec. Constraints</i>
<i>Long-Run</i>			
Executive Constraints	0.256 [0.238]	0.571** [0.275]	0.601*** [0.218]
<i>Short-Run</i>			
Executive Constraints	-0.082 [0.075]	0.141 [0.104]	-0.025 [0.042]
<i>EC Coefficient</i>			
Y_{it-1}	-0.163*** [0.021]	-0.166*** [0.023]	-0.143*** [0.017]
<i>t</i> -statistic	-7.76	-7.21	-8.52
<i>CD</i> test	-3.149	-2.371	-3.146
(<i>p</i> -value)	(0.002)	(0.018)	(0.002)
Observations (<i>N</i>)	3240 (31)	3000 (31)	3240 (31)
Panel B: Consumption taxes/total taxes and Executive Constraints			
	<i>Judicial</i>	<i>Legislative</i>	<i>Exec. Constraints</i>
<i>Long-Run</i>			
Executive Constraints	0.213 [0.79]	0.317 [0.410]	0.120 [0.107]
<i>Short-Run</i>			
Executive Constraints	0.089 [0.073]	0.023 [0.158]	-0.006 [0.061]
<i>EC Coefficient</i>			
Y_{it-1}	-0.300*** [0.056]	-0.323*** [0.050]	-0.300*** [0.053]
<i>t</i> -statistic	-5.33	-6.46	-5.71
<i>CD</i> test	-2.280	-1.503	-1.955
(<i>p</i> -value)	(0.023)	(0.133)	(0.051)
Observations (<i>N</i>)	2069 (30)	1861 (31)	2069 (30)
Panel C: Trade taxes/total taxes and Executive Constraints			
	<i>Judicial</i>	<i>Legislative</i>	<i>Exec. Constraints</i>
<i>Long-Run</i>			
Executive Constraints	0.535 [0.576]	-0.596 [0.578]	-0.147 [0.289]
<i>Short-Run</i>			
Executive Constraints	0.147 [0.089]	0.038 [0.119]	0.136 [0.071]
<i>EC Coefficient</i>			
Y_{it-1}	-0.085*** [0.022]	-0.116*** [0.028]	-0.088*** [0.021]
<i>t</i> -statistic	-3.95	-4.13	-4.16
<i>CD</i> test	-3.256	-3.136	-3.495
(<i>p</i> -value)	(0.001)	(0.002)	(0.000)
Observations (<i>N</i>)	4028 (31)	3726 (31)	4028 (31)

Notes: The long-run and short-run averages are reported, with standard errors reported in parentheses. *CD* test is the Pesaran (2015) test distributed $N(0,1)$ under the null of weak cross-section independence (*p*-value in parentheses below). *, **, *** indicate significance at 10%, 5% and 1% respectively.

A3.4 Error Correctio Model: introducing historical macro variables

Here we extend the analysis by including more historical macro variables: historical GDP data, trade openness, and public expenditure. Per capita GDP data is from the Maddison project database (Bolt and van Zanden 2020, 2014). The measure of trade openness is the ratio of the total value of a country's exports and imports (in 2014 US millions of dollars) and GDP, using data from Barbieri and Keshk (2016), as published in the V-Dem dataset. Finally, from the V-Dem dataset, we choose a variable assessing the nature of public spending: "Particularistic or public goods" expenditure (v2dlencmps). Low scores indicate "particularistic spending": narrowly targeted on a specific corporation, sector, social group, region, party, or set of constituents. Such spending may be referred to as "pork", "clientelist", or "private goods." High scores indicate "Public-goods" spending: intended to benefit all communities within a society, though it may be means-tested so as to target poor, needy, or otherwise underprivileged constituents (all who satisfy the means-test are allowed to receive the benefit). The results are below. The statistical significance across specifications of the ECM term supports the hypothesis of cointegration and so confirms our earlier results. Short- and long-run estimates, representing average effects, are also in this case mostly insignificant, suggesting that such effects may be heterogenous.

Table A10: ECM estimates: total taxes, executive constraints, GDP, trade openness and public expenditure

	<i>Judicial</i>	<i>Legislative</i>	<i>Exec. Constraints</i>
<i>Long-Run</i>			
Executive Constraints	-0.152 [0.098]	-0.314* [0.181]	-0.164 [0.114]
GDP <i>per capita</i>	0.102 [0.122]	0.016 [0.146]	0.076 [0.136]
Spending	0.107 [0.179]	0.216 [0.157]	0.078 [0.140]
Trade	-0.099 [0.050]	-0.052 [0.056]	-0.045 [0.062]
<i>Short-Run</i>			
Executive Constraints	-0.109** [0.044]	-0.100 [0.064]	0.020 [0.024]
GDP <i>per capita</i>	-0.224*** [0.071]	-0.213*** [0.069]	-0.250*** [0.068]
Spending	0.074 [0.072]	0.158*** [0.061]	0.060 [0.063]
Trade	0.066*** [0.024]	0.088*** [0.026]	0.056*** [0.023]
<i>EC Coefficient</i>			
y_{it-1}	-0.342*** [0.034]	-0.297*** [0.040]	-0.317*** [0.035]
<i>t</i> -statistic	-10.01	-7.47	-9.14
<i>CD</i> test	-3.489	-2.322	-3.209
(<i>p</i> -value)	(0.049)	(0.020)	(0.001)
Observations (<i>N</i>)	3510 (<i>31</i>)	3290 (<i>31</i>)	3510 (<i>31</i>)

Notes: The long-run and short-run averages are reported, with standard errors reported in parentheses. *CD* test is the Pesaran (2015) test distributed $N(0,1)$ under the null of weak cross-section independence (*p*-value in parentheses below). *, **, *** indicate significance at 10%, 5% and 1% respectively.

A3.5 Evidence from a global sample

Evidence from historical data covering 31 countries suggests that there is a long-run relationship between taxation and political institutions placing limits on the executive power. But would cointegration exist also for a broader sample of countries? This is not guaranteed, as our results also suggest that this relationship can be different in different contexts, and hence would be worth exploring. We make a first pass here.

We resort to the *Government Revenue Dataset* (UNU-WIDER 2020), which provides comparable tax variables for a global sample of countries for 1980-2018 (including all the countries in Andersson and Brambor 2019).¹ We select the total tax-to-GDP, direct tax-to-GDP, indirect tax-to-GDP, total income tax-to-GDP, consumption tax-to-GDP (taxes on goods and services), and trade tax-to-GDP. The tables below report ECM estimates, replicating Table 2 results with the *Government Revenue Dataset*.

ECM estimates support the existence of a long-run relationship for a sample of up to 119 countries and confirm that country heterogeneity may be important (see results in appendix). One, however, should read these results with caution. We are analysing historical phenomena, which require many years of data. Existing global datasets have, instead, a rather limited temporal coverage and the *Government Revenue Dataset* is no exception. This is a significant limitation for cointegration analysis. Whether cointegration between executive constraints and taxation extends to a global sample is perhaps something we cannot empirically support yet.

¹ Countries (countries from the Andersson-Brambor sample are in italics): Algeria, Angola, Argentina, Australia, Austria, Bangladesh, Belgium, Belize, Benin, Bhutan, Bolivia, Botswana, Brazil, Burkina Faso, Burundi, Cameroon, Canada, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Democratic Republic of Congo, Republic of Congo, Costa Rica, Cote d'Ivoire, Cuba, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Ethiopia, Fiji, Finland, France, Gabon, Gambia, Germany, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, India, Indonesia, Iran, Ireland, Italy, Jamaica, Japan, Jordan, Kenya, Kiribati, Kyrgyzstan, Laos PDR, Lebanon, Lesotho, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Islands, Mauritania, Mauritius, Mexico, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Norway, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Portugal, Rwanda, Samoa, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Solomon Islands, South Africa, Spain, Sri Lanka, St Vincent and the Grenadines, St. Kitts, St. Lucia, Sudan, Suriname, Swaziland, Sweden, Switzerland, Tanzania, Thailand, Togo, Tonga, Tunisia, Turkey, Uganda, United Kingdom, United States of America, Uruguay, Vanuatu, Venezuela, Vietnam, Zambia, Zimbabwe.

Table A11: ECM estimates: Total Taxes, *Government Revenue Dataset*

	Judicial	Legislative	Executive
<i>Long-Run</i>			
Constraints	0.034 [0.065]	-0.045 [0.062]	0.124 [0.095]
<i>Short-Run</i>			
Constraints	0.073*** [0.027]	0.005 [0.031]	0.017 [0.030]
<i>EC Coefficient</i>			
y_{it-1}	-0.383*** [0.021]	-0.490*** [0.025]	-0.476*** [0.024]
t -statistic	-17.88	-19.62	-19.86
CD test	0.781	2.508	2.503
(p -value)	(0.435)	(0.012)	(0.012)
Observations (N)	3987 (119)	3722 (118)	3722 (118)

Notes: Results are based on the ECM as in Table 2. The long-run and short-run averages are reported, with standard errors reported in parentheses below. CD test is the Pesaran (2015) test distributed $N(0,1)$ under the null of weak cross-section independence (p -value in parentheses below). *, **, *** indicate significance at 10%, 5% and 1% respectively.

Table A12: ECM estimates: Direct Taxes/Total Taxes, *Government Revenue Dataset*

	Judicial	Legislative	Executive
<i>Long-Run</i>			
Constraints	0.104 [0.071]	0.023 [0.064]	0.155* [0.081]
<i>Short-Run</i>			
Constraints	0.081** [0.041]	-0.043 [0.026]	0.036 [0.039]
<i>EC Coefficient</i>			
y_{it-1}	-0.447*** [0.027]	-0.556*** [0.027]	-0.535*** [0.028]
t -statistic	-16.44	-20.38	-20.30
CD test	-0.671	0.719	0.462
(p -value)	(0.502)	(0.471)	(0.644)
Observations (N)	3314 (110)	3104 (109)	3104 (109)

Notes: See table A5 above.

Table A13: ECM estimates: Indirect Taxes/Total Taxes, *Government Revenue Dataset*

	Judicial	Legislative	Executive
<i>Long-Run</i>			
Constraints	0.094* [0.052]	0.019 [0.038]	0.048 [0.054]
<i>Short-Run</i>			
Constraints	-0.014 [0.017]	0.022* [0.012]	0.026 [0.024]
<i>EC Coefficient</i>			
y_{it-1}	-0.394*** [0.023]	-0.489*** [0.024]	-0.467*** [0.024]
t -statistic	-16.90	-20.42	-19.51
CD test	0.355	3.923	1.741
(p -value)	(0.722)	(0.000)	(0.082)
Observations (N)	3417 (111)	3212 (111)	3212 (111)

Notes: See Table A5 above.

Table A14: ECM estimates: Income Taxes/Total Taxes, Government Revenue Dataset

	Judicial	Legislative	Executive
<i>Long-Run</i>			
Constraints	-0.073 [0.089]	0.015 [0.092]	-0.043 [0.107]
<i>Short-Run</i>			
Constraints	-0.040 [0.039]	-0.056* [0.031]	-0.067 [0.043]
<i>EC Coefficient</i>			
y_{it-1}	-0.383*** [0.029]	-0.459*** [0.021]	-0.468*** [0.026]
<i>t</i> -statistic	-13.25	-21.76	-19.15
<i>CD</i> test	-1.377	-0.165	-0.395
(<i>p</i> -value)	(0.168)	(0.869)	(0.693)
Observations (<i>N</i>)	3240 (106)	3057 (106)	3057 (106)

Notes: See Table A5 above.

Table A15: ECM estimates: Consumption Taxes/Total Taxes, Government Revenue Dataset

	Judicial	Legislative	Executive
<i>Long-Run</i>			
Constraints	0.077 [0.092]	0.016 [0.067]	0.142 [0.109]
<i>Short-Run</i>			
Constraints	-0.022 [0.035]	0.029 [0.028]	0.004 [0.038]
<i>EC Coefficient</i>			
y_{it-1}	-0.411*** [0.029]	-0.446*** [0.028]	-0.425*** [0.028]
<i>t</i> -statistic	-14.19	-16.07	-14.99
<i>CD</i> test	-0.200	1.279	1.841
(<i>p</i> -value)	(0.842)	(0.201)	(0.066)
Observations (<i>N</i>)	3200 (106)	3002 (105)	3002 (105)

Notes: See Table A5 above.

Table A16: ECM estimates: Trade Taxes/Total Taxes, Government Revenue Dataset

	Judicial	Legislative	Executive
<i>Long-Run</i>			
Constraints	0.058 [0.148]	-0.109 [0.139]	0.034 [0.161]
<i>Short-Run</i>			
Constraints	-0.012 [0.050]	-0.041 [0.038]	-0.018 [0.062]
<i>EC Coefficient</i>			
y_{it-1}	-0.332*** [0.028]	-0.401*** [0.029]	-0.397*** [0.030]
<i>t</i> -statistic	-11.70	-13.99	-13.22
<i>CD</i> test	-0.679	2.156	0.801
(<i>p</i> -value)	(0.497)	(0.031)	(0.423)
Observations (<i>N</i>)	2998 (103)	2799 (102)	2799 (102)

Notes: See Table A5 above.

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