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The Fiscal Contract: States, Taxes, and Public Services
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Supplementary Material

The following tables accompany the aforementioned article. Readers are advised to consult the original piece (or the author) for a more detailed explanation of the results.

Supplementary Tables

Table 1: Social Security and Trade Taxes (1995, base regression)

	Infant mortality (log)	Public Health Spending	Life Expectancy	DPT Immunizations	Measles Immunization
Revenue Goods & Services	-0.0282*	0.1037	0.1898	0.5949	0.9312**
	(0.0156)	(0.0665)	(0.1729)	(0.3598)	(0.3746)
Revenue Capital	0.0031	-0.0191	-0.2925	-0.6700*	-1.0147**
	(0.0197)	(0.0427)	(0.2440)	(0.3758)	(0.4495)
Revenue Social Security	-0.0334**	0.2066***	-0.0873	0.1040	-0.4572
	(0.0137)	(0.0322)	(0.1411)	(0.2817)	(0.3626)
Revenue Trade Taxes	0.0610**	0.0648	-0.7433	-1.6583*	-1.2106
	(0.0234)	(0.1131)	(0.4806)	(0.8617)	(0.8312)
GDP per capita (log), PPP	-0.7154***	0.8349**	4.7919***	5.3595**	2.5006
	(0.0961)	(0.3559)	(1.1826)	(2.5440)	(2.5368)
Urban Population	-0.0007	-0.0143	0.1086**	-0.0462	0.1448
	(0.0036)	(0.0135)	(0.0520)	(0.1183)	(0.1086)
Land Area (log)	0.0543	0.4317***	-0.9889	-0.0684	0.6323
	(0.0486)	(0.1113)	(0.6392)	(1.0249)	(0.9671)
Population (log)	0.0486	-0.5752	0.5817	-0.1989	-0.2846
	(0.0629)	(0.1523)**	(0.8509)	(1.4437)	(1.3654)
Polity	0.0065	0.0447	0.0833	-0.3028	-0.1047
	(0.0102)	(0.0485)	(0.1267)	(0.2115)	(0.1793)
Constant	7.8880***	-1.2495	24.4712	55.9736*	59.2606**
	(0.9657)	(2.2595)	(15.3725)	(29.3921)	(29.3826)
Observations	59	59	59	58	59
R-squared	0.8582	0.6925	0.7081	0.3966	0.3493
Prob>F	0.0000	0.0000	0.0000	0.0130	0.0149

Notes: Social Security taxes are typically negative and significant with infant mortality (logged) and positive and significant with public health spending. They are not typically significant with the other public service outcomes. Trade Taxes are typically positive with infant mortality and negative with everything else.

Summary statistics 1995

Variable	Obs	Mean	Std. Dev.	Min	Max
infant mortality	149	3.333148	1.091527	1.302913	5.151363
public health spending	137	3.251715	1.986761	.325	8.6
life expectancy	149	64.24749	11.76088	36.86797	80.26249
DPT immunizations	148	79.94279	20.16488	20.4	100
Measles immunizations	148	79.51993	18.28207	20.6	100
social security taxes	68	5.93795	5.169636	.050413	17.90023
Trade taxes	90	2.583006	3.204642	-.0108486	24.43036

Table 2: Taxes and Total Transfers % of GDP (alternative specifications)

	XTPCSE	XTPCSE	XTPCSE	XTPCSE w/ Year Dummies	XTPCSE w/ Country Dummies	XTPCSE w/ Year&Country Dummies
	total transfers	total transfers	total transfers	total transfers	total transfers	total transfers
Total $_{t-1}$	1.300***	1.288***	1.261***	1.246***	1.152***	1.065***
	(0.094)	(0.093)	(0.107)	(0.086)	(0.094)	(0.088)
Total $_{t-2}$	-0.381***	-0.371***	-0.380***	-0.362***	-0.416***	-0.321***
	(0.095)	(0.094)	(0.103)	(0.083)	(0.087)	(0.080)
Revenue Goods &	0.074***	0.076***	0.091***	0.082***	0.123**	0.177***
Services	(0.025)	(0.026)	(0.026)	(0.023)	(0.072)	(0.064)
Revenue Capital	0.009	0.015	0.034	0.030*	0.109**	0.108***
	(0.016)	(0.019)	(0.022)	(0.016)	(0.043)	(0.037)
Other Revenue	0.028*	0.030*	0.072***	0.080***	0.077**	0.058
	(0.016)	(0.016)	(0.024)	(0.018)	(0.037)	(0.035)
GDP per capita	0.446	0.408	0.666	0.471	0.812	-2.182
(log pppp)	(0.469)	(0.483)	(0.469)	(0.425)	(1.209)	(1.479)
urban pop %	0.003	0.004	0.002	0.004	0.163***	0.061
	(0.006)	(0.006)	(0.006)	(0.006)	(0.043)	(0.042)
pop65 %	0.025	0.027	-0.109**	-0.127***	-0.064	-0.372***
	(0.033)	(0.036)	(0.047)	(0.046)	(0.103)	(0.092)
Capital controls		-0.007	0.270	0.125	0.564***	0.317**
		(0.114)	(0.143)	(0.123)	(0.155)	(0.127)
Trade/GDP		-0.003	-0.008**	-0.008***	-0.018	-0.056***
		(0.003)	(0.003)	(0.002)	(0.012)	(0.014)
Veto Players		0.096**	0.085*	0.121***	0.049	0.032
(Cabinet)		(0.046)	(0.046)	(0.046)	(0.058)	(0.054)
Neocorporatism			0.457**	0.318	0.129	1.803
			(0.202)	(0.192)	(1.190)	(1.172)
Voter turnout			-0.003	-0.006	-0.018	0.010
			(0.005)	(0.004)	(0.017)	(0.016)
Union Net			2.170***	2.646***	1.159	5.581**
			(0.629)	(0.519)	(1.966)	(2.253)
Constant	-4.336	-4.150	-6.255	-3.869	-20.096	16.681
	(4.554)	(4.617)	(4.534)	(3.760)	(12.012)	(15.768)
Observations	319	318	289	286	286	286
Groups	18	18	18	17	17	17
R-squared	0.9808	0.9813	0.9830	0.9872	0.9862	0.9898
F-test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
F-year				0.0000		0.0000
F-country					0.0000	0.0000
F-GS=CAP	0.0319	0.0650	0.0843	0.0906	0.8654	0.3570

Notes: Eliminating serial correlation requires 2-lags of the dependent variable, which demonstrates 2nd order stability. The estimated coefficients represent the long-run equilibria, which can be calculated by dividing the relevant coefficient by 1 minus the coefficients of the lagged dependent variables (e.g., for Goods and Services Revenue column 1, 0.074/(1-1.300+0.381)=0.914). Hence, in the long-run, a one SD increase in GS is associated with two-thirds of a SD increase in total social spending (SD for GS=4.26; SD for Total Social Spending=5.93). Regressions with year and/or country exclude Germany because missing observations make it impossible to calculate the VCE using the pairwise option.

Table 3: Infant Mortality, Democracy and Revenue

	OLS MODEL	GEE MODEL	OLS MODEL	GEE
	PCSE FE	(AR1 CORRECTION)	PCSE FE	(AR1 CORRECTION)
LAGINFANT	0.744*** (0.052)		0.739*** (0.054)	
POPULATION (LOG)	-3.955 (4.559)	-47.255*** (7.298)	-3.571 (4.808)	-5.243*** (1.699)
URBAN POPULATION	-0.025 (0.106)	-0.473 (0.352)	-0.009 (0.109)	-0.877*** (0.124)
PER CAPITA GDP (LOG) PPP	0.720 (0.905)	-6.181*** (2.004)	0.883 (0.929)	-14.214*** (2.008)
POLITY	**-0.176** (0.079)**	**-0.210 (0.140)**	**-0.199** (0.086)**	**-0.343*** (0.117)**
TOTAL REVENUE	-0.073 (0.049)	0.160 (0.123)		
REVENUE CAPITAL			**-0.031 (0.107)**	**0.252 (0.170)**
REVENUE GOODS & SERVICES			**-0.404* (0.224)**	**-0.925*** (0.269)**
OTHER REVENUE			-0.055 (0.055)	0.063 (0.143)
CONSTANT	85.407 (95.312)	1,083.3*** (146.286)	46.240 (68.780)	307.352*** (28.075)
OBSERVATIONS[2]	376	441	374	442
GROUPS	121	109	121	110
R-SQUARED	0.9914		0.9914	

Notes: Panel regressions using 5-year averages, with XTPCSE and country fixed- effects and XTGEE with an AR1 correction. The Dependent Variable is infant mortality. Although the results are favourable for the fiscal contract (i.e., revenue from goods and service is negative and significant with infant mortality with both methods), test diagnostics indicate that serial correlation has not been eliminated. Note: Stata dropped some observations because of multi-collinearity.

Table 4: XTABOND2 Specifications with infant mortality and total social spending

	Infant Mortality (log)	Infant Mortality (log)	Infant Mortality (log)	Total Social Spending	Total Social Spending
Endogenous Variables					
Revenue Goods & Services	**-0.032*** (0.011)**	**-.029** (0.013)**	**-0.031*** (0.010)**	**0.852*** (0.211)**	**0.576*** (0.176)**
Revenue Capital	**0.017* (0.009)**	**0.015 (0.010)**	**0.022** (0.010)**	**-0.066 (0.175)**	**0.111 (0.112)**
Other Revenue	**-0.004 (0.004)**		**-0.001 (0.004)**	**0.375*** (0.090)**	**0.500*** (0.070)**
Lag Structure[1]	2, 9	1, 10	2, 5	2, 7	2, 4
Exogenous Variables[2]					
GDP15Log	-0.799*** (0.051)	-0.795*** (0.044)	-0.705*** (0.059)	2.772*** (0.541)	2.067*** (0.511)
Pop1564Log	0.008 (0.024)	-0.051 (0.036)	-0.046 (0.035)	-0.002 (0.007)	0.009* (0.004)
Polity[3]	-0.022*** (0.007)	-0.021*** (0.006)	-0.024*** (0.006)		
Logland		0.077** (0.034)	0.072** (0.032)	0.157 (0.277)	0.140 (0.229)
Urban Population %			-0.005** (0.002)	0.103 (0.062)	0.031 (0.042)
Gross Union %					12.110*** (3.449)
Constant	10.638*** (0.421)	10.527*** (0.408)	9.989*** (0.489)	-38.789*** (6.567)	-41.415*** (6.125)
Instruments	627	515	369	363	353
Groups	127	127	127	18	18
Observations	1299	1299	1299	317	304
Sargon/Hansen Test[3]	1.000	1.00	1.00	1.000	1.00
1st order autocorrelation Z-stat[4]	-1.55	-1.69	-2.10	-1.86	1.56
2nd order autocorrelation Z-stat	1.14	1.13	0.98	1.56	-1.78

Notes

[1]Lag structure refers to the period and number of lags used as instruments with the endogenous variables. The first number refers to the first period to begin with (say, T-2 in Model 1), while the second refers to the number of lags to use (say, 9 in Model 1). The results with different lag structures were consistent with those above, but no specification I tried solved the over-identication problem and eliminated serial correlation.

[2]The endogenous and exogenous variables are defined in the paper except the following:
GDP15Log = Per capita GDP PPP-adjusted, multiplied by the percentage of the population above age 15.
Pop1564(log)= The total number of people between the ages of 15 and 64, logged.

[3]Treating Polity as an endogenous variable results in no significant changes vis-à-vis the results reported above.

[4]The null hypothesis for the Sargon and Hansen tests is that the instruments are valid. Given the P-value of 1, we reject that hypothesis and conclude that the instruments are not valid.

[5]The null hypothesis for the autocorrelation tests is that there is no autocorrelation. The Z-values sometimes allow us to reject that hypothesis, but in other cases we cannot reject it (e.g., Model 3, AR1-test).

Are tax systems endogenous?

While it is impossible to reject endogeneity without a formal test, the following back of the envelop calculation indicates that it is devilishly difficult to explain tax systems merely using the structural and institutional characteristics of a country. The following tables present results from cross-sections for 1995 (all countries with data, World Bank 2001), using Zellner´s seemingly unrelated regression methods that look at taxes as dependent variables. While they are not a formal test of endogeniety, the modest R-squared, even with a battery of control variables, indicate that most of the explanation is in the error term. While no efforts have been made to obtain the best specification (this is a back of the envelop exercise), it is striking that very few of the variables seem to be statistically significant. Picking other years, pooling the data or using panel analysis yields similar results in terms of the R-squared and low levels of significance of most variables.

Table 5: Seemingly unrelated regressions, 1995

DV	IV			N	R-squared	P-value
Rev. Goods & Services		Coefficient	Std. Error	86	**0.2925**	0.0000
	GDPPC PPP (log)	-.2523626	.737361			
	Land (log)	-.3159066	.3058686			
	Population (log)	-.3173219	.3433094			
	Pop. Urban	.0052168	.0245401			
	Pop. 1564 %	.2975862***	.0977882			
	Polity	.069479	.0655657			
	Trade GDP	-.0087062	.0104091			
	Constant	-.2028013	6.244529			
Rev. Capital				86	**0.2475**	0.0002
	GDPPC PPP (log)	2.983161***	.8876308			
	Land (log)	.6456566*	.3700275			
	Population (log)	-.2630048	.4151574			
	Pop. Urban	-.0350052	.0297052			
	Pop. 1564 %	-.1503927	.1161008			
	Polity	.0763674	.0793136			
	Trade GDP	.016322	.0126016			
	Constant	-14.1456*	7.546832			
Rev. Other				86	**0.2126**	0.0013
	GDPPC PPP (log)	2.127428*	1.246186			
	Land (log)	-.4025489	.6031281			
	Population (log)	-.869656	.7646364			
	Pop. Urban	-.0071089	.049813			
	Pop. 1564 %	-5.32e-09	8.08e-09			
	Polity	-.1851459	.1291566			
	Trade GDP	.0116123	.0209699			
	Constant	15.15175	13.24614			

Table 6: Seemingly unrelated regressions, 1995

DV	IV			N	R-squared	P-value
Rev. Goods & Services		Coefficient	Std. Error	53	**0.4563**	0.0000
	GDPPC PPP (log)	-1.148306	1.22906			
	Manufacturing Value Added	-.0511978	.1314611			
	Industry Value Added	-.0732444	.0906311			
	Land (log)	.2893328	.3660368			
	Population (log)	-.8100656*	.4749669			
	Pop. Urban	.0203476	.0203476			
	Pop. 1564 %	.4124555***	.153994			
	Polity	-.0167154	.0813313			
	Presidential	-.5426926	1.073834			
	Federal	-1.286085	1.137436			
	Trade GDP	-.0014905	.0132559			
	Fuel Exports	-.0463092	.029683			
	Constant	5.357401	11.18457			
Rev. Capital				53	**0.4520**	0.0000
	GDPPC PPP (log)	3.210127**	1.629393			
	Manufacturing Value Added	-.4843131***	.174281			
	Industry Val. Added	.1046215	.1201518			
	Land (log)	.9668798**	.4852633			
	Population (log)	-.0095237	.6296745			
	Pop. Urban	-.0448674	.0505775			
	Pop. 1564 %	.0242677	.2041534			
	Polity	.0134412	.1078228			
	Presidential	-2.931839**	1.423606			
	Federal	-1.755401	1.507925			
	Trade GDP	.0219767	.0175737			
	Fuel Exports	-.0192973	.0393514			
	Constant	-25.77025	14.82763*			
Rev. Other				53	**0.4104**	0.0002
	GDPPC PPP (log)	3.435999	2.47154			
	Manufacturing Val. Added	.1379175	.2643576			
	Industry Val. Added	-.1761916	.1822518			
	Land (log)	-2.051319***	.7360702			
	Population (log)	.3071989	.9551199			
	Pop. Urban	.0106503	.0767184			
	Pop. 1564 %	-.2156266	.3096694			
	Polity	-.3760481**	.1635507			
	Presidential	.0735058	2.159392			
	Federal	-.7281297	2.287292			
	Trade GDP	-.0331317	.0266566			
	Fuel Exports	.0636524	.0596901			
	Constant	24.14813	22.49125			