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Openness, country size, and government size: Additional evidence from a large cross-country panel☆

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ABSTRACT

A body of influential research has suggested that there is a negative association between country size and government size and between country size and openness, and these may account for the positive association between openness and government size. Estimation of several models from 41-year panel data for over 150 countries indicates that while pooled OLS estimates support the foregoing scenario, when cross-country heterogeneity is taken into consideration through the fixed-effects format, there is little evidence of a negative association of country size with either government size or openness. Therefore, it does not seem likely that positive association between openness and government size arises due to the mediating role of country size.

1. Introduction

In an important work, Rodrik (1998) documented a positive covariation between a country's trade openness and the size of its government, and suggested that the larger government size is a response to the increased income risk that greater openness usually entails. In another influential work, Alesina and Wacziarg (1998) noted a negative covariation of country size with trade openness and with share of public consumption in GDP. They suggested that the combination of these negative correlations may account for the positive relation between trade openness and government size documented by Rodrik (1998). More specifically, they argued (p. 306) that the positive link between openness and government size is mediated by country size and thus casts doubt on the existence of a Rodrik-type direct link between openness and share of government consumption.

Rodrik's (1998, pp. 1003, 1005, 1007, 1016, 1020, 1022, 1027) study was based mainly on cross-section data for the late 1980s and early 1990s.[1] The study by Alesina and Wacziarg (1998) was based largely on cross-section data for the 1980s.

This paper revisits the foregoing covariations by working with 41-year panel data covering the period 1960–2000 for 154 countries and several models of the kind used by Alesina and Wacziarg (1998). The main finding is that while ordinary least-squares (OLS) regressions do indicate the pattern suggested by Alesina and Wacziarg, when cross-country heterogeneity is partially accounted for through the fixed-effects format, there is little indication of a significant negative covariation of country size with either trade openness or government size. These estimates thus do not support the Alesina–Wacziarg view that the positive covariation between trade openness and share of government consumption in GDP is due to the mediating role of country size. Therefore, the estimates are consistent with the possibility of a direct link between openness and government size along the lines suggested by Rodrik (1998).

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[1] Rodrik (1998, p. 1018) also verified the main argument through estimation of a 7-period panel of 5 years each from 1960 to 1992.

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2. Model, data, and the main results

A parsimonious set of equations of the kind initially estimated by Alesina and Wacziarg (1998, p. 310) is specified. The equations may be written as

$$\mathrm{LGOV}_{it} = a_0 + a_1 \mathrm{LSIZE}_{it} + a_2 \mathrm{LRY}_{it} + u_{i1t} \tag{1}$$

$$\mathrm{LOPEN}_{it} = b_0 + b_1 \mathrm{LSIZE}_{it} + b_2 \mathrm{LRY}_{it} + u_{i2t} \tag{2}$$

$$\mathrm{LGOV}_{it} = c_0 + c_1 \mathrm{LOPEN}_{it} + c_2 \mathrm{LRY}_{it} + u_{i3t} \tag{3}$$

where LGOV_{it} denotes natural logarithm of government "size" in country i and year t; LOPEN is (logarithm of) a measure of trade openness; LSIZE denotes logarithm of the country's size; LRY is a "control" variable and stands for logarithm of real GDP per capita; and u's are the stochastic error terms. Eqs. (1) and (2) represent a simple version of the position articulated by Alesina and Wacziarg (1998). Eq. (3) reflects the basics of Rodrik's (1998) position. In the absence of other conditioning variables, these equations are more likely to show covariations of the kind proposed by Alesina and Wacziarg (and Rodrik). The only "control" variable is real GDP per capita, which is included due to its somewhat "basic" nature in a cross-country context and also due to an association with government size in terms of Wagner's hypothesis and a possible role in affecting openness. Although Rodrik (1998) used most variables in logarithms, Alesina and Wacziarg (1998) apparently employed a mix of levels and logarithms. In Eqs. (1), (2) and (3) all variables are entered in logarithms for uniformity.

Proxies for the variables are fairly standard. As in the basic formulations of Rodrik (1998) and Alesina and Wacziarg (1998), government size is represented by the share (percent) of government consumption in GDP. Similarly, country size is proxied by population; and ratio (percent) of trade (imports+exports) to GDP is the measure of openness.[2] Since the sample covers a long period and includes a large group of diverse countries, GDP per capita in international dollars at constant prices is used. All data are taken from PWT 6.1 compiled by Heston et al. (2002), which is a widely-used source for variables relevant to this study. The period covered is 1960–2000, and 154 countries, for which usable information was available, have been included.

Eqs. (1), (2) and (3) are estimated in several different formats. Following Alesina and Wacziarg (1998), the estimation is first done by the ordinary least-squares (OLS) procedure from pooled annual data. To take some account of cross-country heterogeneity, which is likely to be substantial in the large and diverse sample, two-way fixed-effects format is then estimated by including country- and time-dummies. Inclusion of country-dummies in the presence of slow-moving population should not be worrisome since 5-year and 10-year averaging introduce fairly large variations in intracountry population values. The fixed-effects procedure purges the main parameter estimates of contamination due to the effect of country-specific and year-specific factors on the dependent variables.[3] Although random-effects procedure provides an alternative to the fixed-effects format, Hausman's tests reject the random-effects model in almost all cases.

In addition to annual data, the three models are also estimated from 5-year and 10-year averages of the variables. Estimates from averaged data are helpful in several ways. First, these provide a useful sensitivity check on the estimates from data with different levels of temporal aggregation. Second, relative to the fixed-effects format, these alleviate the worry that the effect of the slow-growing population might be captured by the fixed-effects country-dummies. Third, aggregation evens out cyclical variations that are likely to be present in annual observations.

Table 1 contains OLS and fixed-effects estimates of Eq. (1) from annual observations and 5-year and 10-year averages. Table 2 reports the corresponding estimates of Eq. (2), and Table 3 shows the estimates for Eq. (3). Tables 1 and 2 look at the hypothesis proposed by Alesina and Wacziarg (1998) and Table 3 indicates the position relative to Rodrik's (1998) basic position. In all cases, reported t-statistics are based on White's (1980) heteroscedasticity-consistent standard errors to enhance the reliability of the inferences.

The OLS estimates in Tables 1 and 2 support well the Alesina–Wacziarg hypothesis. In every case, the association between government size and country size and that between openness and country size is negative and statistically significant. This is true not merely in pooled annual data, but also for (pooled) 5-year and 10-year averages, and consistency across the three aggregation levels is notable.

When fixed-effects estimates are considered, the position undergoes a major change. There is no evidence of a negative association between government size and country size or between openness and country size. The covariation between government size and country size in Table 1 is significantly positive, and that between openness and country size in Table 2 is also positive but is tiny in magnitude and lacks statistical significance. It is perhaps worth noting that the foregoing scenario holds consistently across the three aggregation levels. While one might worry that fixed-effects estimates from annual observations could confound the role of country-dummies with that of the slow-growing population, such confounding is unlikely in 10-year or even 5-year averaged data where there are fairly large variations in population across the intracountry observations.[4]

[2] Since the variables are in logarithms, and real GDP per capita is a regressor in the models, use of population is almost equivalent to using aggregate GDP, which can be an alternative proxy for country size.

[3] If one-way fixed-effects format is used so as to let the intercept term vary only across countries, the pattern of estimates is similar.

[4] Even in annual data, intracountry dispersion of population across years is broadly of the same order as of other variables. For example, mean intracountry coefficients of variation for population, GDP per capita, openness, and government size are 18.55, 23.11, 23.95 and 24.25 respectively.

Table 1
Country size and government size: Eq. (1) of the text, 154-country panel data for 1960–2000, dependent variable is logarithm of government size

	OLS			Fixed effects		
	(1)	(2)	(3)	(4)	(5)	(6)
	Annual data	5-year means	10-year means	Annual data	5-year means (a)	10-year means (b)
Constant	4.653*	4.757*	4.861*	(c)	(c)	(c)
	(62.25)	(29.37)	(21.81)			
LPOP	−0.080*	−0.084*	−0.090*	0.475*	0.441*	0.422*
	(−17.43)	(−8.62)	(−6.67)	(10.84)	(4.95)	(3.67)
LRY	−0.139*	−0.144*	−0.151*	−0.160*	−0.172*	−0.200*
	(−18.84)	(−8.98)	(−6.89)	(−6.40)	(−3.30)	(−3.08)
R^2	0.11	0.13	0.15	0.80	0.84	0.86
F-statistic				87.10*	24.16*	13.49*
Hausman *m*				72.63*	31.69*	17.76*
N	5117	1027	509	5117	1027	509

Note. Government size is proxied by government consumption as percent of GDP, and population represents "country size". LPOP denotes logarithm of population. LRY stands for logarithm of real GDP per capita in international dollars at (chained) constant prices. All data are taken from PWT 6.1.
Numbers in parentheses are *t-statistics that are based on White's consistent standard errors*. An asterisk indicates statistical "significance" at least at the 5% level. Fixed-effects estimates are "two way", and permit the constant term to vary across countries and years (periods). *F*-statistics test the null of OLS being more appropriate than the fixed-effects format, and the null is rejected in all cases. Hausman *m* statistics test the null that random-effects format is more appropriate than fixed-effects model, and reject the null in all cases. *N* stands for the number of observations.
(a) Excludes three countries for which missing data led to only one observation.
(b) Excludes 19 countries for which missing data led to only one observation.
(c) "Constant term" in FE models is not meaningful, and its estimates (as of country- and time-dummies) are not reported.

Table 3 shows reasonable support for Rodrik's (1998) hypothesis and indicates a positive association between government size and openness in OLS as well as fixed-effects estimates, and the pattern is fairly uniform across the three aggregation levels.

The message from Tables 1 and 2 may be summarized by saying that while OLS estimates support the position articulated by Alesina and Wacziarg (1998), fixed-effects estimates, which are overwhelmingly preferred over OLS (and random-effects) estimates in terms of the relevant *F*-statistics (and Hausman's *m* statistics), do not show a negative association of government size with country size or of openness with country size.

Although the parsimonious models of Eqs. (1) and (2) might be perceived as being more likely to show support for Alesina–Wacziarg hypothesis than richer specifications, it is useful to conduct further sensitivity checks through models that start with the simplest and are then augmented with other variables included by Alesina and Wacziarg (1998). Such a sensitivity check is particularly useful for the association between government size and country size in which the contrast from their position is the strongest in fixed-effects estimates. Table 4 reports fixed-effects estimates from 10-year averaged data for five different specifications starting with the simplest. Except for regional dummies, the table has the same structure as the corresponding table

Table 2
Country size and openness: Eq. (2) of the text, 154-country panel data for 1960–2000, dependent variable is logarithm of openness

	OLS			Fixed effects		
	(1)	(2)	(3)	(4)	(5)	(6)
	Annual data	5-year means	10-year means	Annual data	5-year means (a)	10-year means (b)
Constant	4.514*	4.519*	4.536*	(c)	(c)	(c)
	(71.28)	(32.96)	(24.50)			
LPOP	−0.205*	−0.203*	−0.203*	0.032	0.076	0.087
	(−55.70)	(−25.82)	(−19.57)	(1.09)	(1.35)	(1.26)
LRY	0.158*	0.158*	0.155*	0.142*	0.149*	0.155*
	(24.30)	(11.12)	(8.01)	(7.81)	(4.20)	(3.34)
R^2	0.44	0.45	0.48	0.87	0.90	0.92
F-statistic				81.63*	24.56*	14.34*
Hausman *m*				28.37*	14.27*	9.14*
N	5117	1027	509	5117	1027	509

Note. Openness is proxied by the sum of imports and exports as percent of GDP, and population represents "country size". LPOP denotes logarithm of population. LRY stands for logarithm of real GDP per capita in international dollars at (chained) constant prices. All data are taken from PWT 6.1.
Numbers in parentheses are *t-statistics that are based on White's consistent standard errors*. An asterisk indicates statistical "significance" at least at the 5% level. Fixed-effects estimates are "two way", and permit the constant term to vary across countries and years (periods). *F*-statistics test the null of OLS being more appropriate than the fixed-effects format, and the null is rejected in all cases. Hausman *m* statistics test the null that random-effects format is more appropriate than fixed-effects model, and reject the null in all cases. *N* stands for the number of observations.
(a) Excludes three countries for which missing data led to only one observation.
(b) Excludes 19 countries for which missing data led to only one observation.
(c) "Constant term" in FE models is not meaningful, and its estimates (as of country- and time-dummies) are not reported.

Table 3
Openness and government size: Eq. (3) of the text, 154-country panel data for 1960–2000, dependent variable is logarithm of government size

	OLS			Fixed effects		
	(1)	(2)	(3)	(4)	(5)	(6)
	Annual data	5-year means	10-year means	Annual data	5-year means (a)	10-year means (b)
Constant	3.282*	3.263*	3.293*	(c)	(c)	(c)
	(42.91)	(19.18)	(13.90)			
LOPEN	0.244*	0.272*	0.278*	0.081*	0.108*	0.158*
	(17.07)	(8.46)	(6.02)	(4.51)	(2.63)	(2.72)
LRY	−0.176*	−0.185*	−0.193*	−0.245*	−0.256*	−0.292*
	(−23.54)	(−11.42)	(−8.68)	(−10.46)	(−5.23)	(−4.79)
R^2	0.12	0.13	0.14	0.79	0.83	0.86
F-statistic				83.85*	23.27*	13.30*
Hausman *m*				18.96*	7.25*	3.18
N	5117	1027	509	5117	1027	509

Note. Openness is proxied by the sum of imports and exports as percent of GDP, and government size is represented by government consumption as percent of GDP. LOPEN denotes logarithm of openness. LRY stands for logarithm of real GDP per capita in international dollars at (chained) constant prices. All data are taken from PWT 6.1.
Numbers in parentheses are *t-statistics that are based on White's consistent standard errors*. An asterisk indicates statistical "significance" at least at the 5% level. Fixed-effects estimates are "two way", and permit the constant term to vary across countries and years (periods). *F*-statistics test the null of OLS being more appropriate than the fixed-effects format, and the null is rejected in all cases. Hausman *m* statistics test the null that random-effects format is more appropriate than fixed-effects model. *N* stands for the number of observations.
(a) Excludes three countries for which missing data led to only one observation.
(b) Excludes 19 countries for which missing data led to only one observation.
(c) "Constant term" in FE models is not meaningful, and its estimates (as of country- and time-dummies) are not reported.

Table 4
Country size and government size: judging sensitivity of fixed-effects estimates through several variants of Eq. (1) of the text, 154-country panel data for 1960–2000, 10-year means: dependent variable is logarithm of government size

	(1)	(2)	(3)	(4)	(5)
LPOP	0.555*	0.432*	0.418*	0.272*	0.258*
	(5.07)	(3.71)	(3.56)	(2.27)	(2.15)
LRY		−0.185*	−0.210*	−0.212*	−0.224*
		(−2.62)	(−2.93)	(−3.04)	(−3.17)
LOPEN			0.155*	0.133*	0.137*
			(2.68)	(2.35)	(2.40)
LURBAN				0.207*	0.213*
				(2.63)	(2.68)
DENSITY					0.101+
					(1.85)
R^2	0.854	0.857	0.860	0.862	0.863
F-statistic	14.14*	13.25*	13.03*	13.07*	12.86*
Hausman *m*	25.46*	17.88*	15.38*	7.94+	10.56+
N	499	499	499	499	499

Note. Government size is proxied by government consumption as percent of GDP, and population represents "country size". LPOP denotes logarithm of population. LRY stands for logarithm of real GDP per capita in international dollars at (chained) constant prices. LOPEN is logarithm of ratio (percent) of imports+exports to GDP. These data are taken from PWT 6.1. LURBAN is logarithm of ratio (percent) of urban population to total population. DENSITY denotes population (in thousands) per square kilometer. Data on urbanization and population density are taken from World Bank (2007), and are for 1965, 1975, 1985 and 1995, which are the mid-points of each period.
Numbers in parentheses are *t-statistics that are based on White's consistent standard errors*. An asterisk indicates statistical "significance" at least at the 5% level, and + indicates significance at 10%. Fixed-effects estimates are "two way", and permit the constant term to vary across countries and years (periods). *F*-statistics test the null of OLS being more appropriate than the fixed-effects format, and the null is rejected in all cases. Hausman *m* statistics test the null that random-effects format is more appropriate than fixed-effects model, and reject the null in all cases. *N* stands for the number of observations.
The sample excludes 19 countries, for which missing data led to only one observation, and Taiwan, which is not included in World Bank (2007), and Singapore for which urbanization was 100%.
"Constant term" in FE models is not meaningful; its estimates (as of country- and time-dummies) are not reported.

of Alesina and Wacziarg (1998, p. 312, Table 3).[5] Besides the variables entered by them, openness is also included so as to provide a somewhat stronger sensitivity check.[6] It may be seen that in no case there is support for the Alesina–Wacziarg view that government size is negatively associated with country size. Every coefficient of LPOP is positive and statistically significant, and the pattern is consistent with the fixed-effects estimates in Table 1.

Although perhaps less important, it seems useful to conduct a similar sensitivity check on the lines of the models of openness estimated by Alesina and Wacziarg (1998, p. 316, Table 6). However, most of the variables entered by them are not suitable for the

[5] It is not necessary to include regional or other intercept dummies in the presence of country dummies.
[6] Alesina and Wacziarg hypothesize that country size is the mediating variable between government size and openness. If that is true, openness should have no significance in government-size regressions in the presence of country size.

Table 5
Country size and openness: judging sensitivity of fixed-effects estimates through several variants of Eq. (2) of the text, 154-country panel data for 1960–2000, 10 year means: dependent variable is logarithm of openness (LOPEN)

	(1)	(2)	(3)	(4)
LPOP	−0.013	0.093	0.051	0.057
	(−0.19)	(1.33)	(0.73)	(0.81)
LRY		0.159*	0.177*	0.185*
		(3.18)	(3.51)	(3.59)
LGOV			0.096*	0.099*
			(2.56)	(2.61)
DENSITY				−0.066
				(−1.04)
R^2	0.910	0.913	0.914	0.915
F-statistic	14.15*	12.73*	12.51*	12.18*
Hausman *m*	4.57*	9.18*	6.22+	7.79+
N	499	499	499	499

Note. Government size is proxied by government consumption as percent of GDP, and population represents "country size". LPOP denotes logarithm of population. LRY stands for logarithm of real GDP per capita in international dollars at (chained) constant prices. LOPEN is logarithm of ratio (percent) of imports+exports to GDP. These data are taken from PWT 6.1. DENSITY denotes population (in thousands) per square kilometer. Data on population density are taken from World Bank (2007), and are for 1965, 1975, 1985 and 1995, which are the mid-points of each period.
Numbers in parentheses are *t-statistics that are based on White's consistent standard errors*. An asterisk indicates statistical "significance" at least at the 5% level, and + denotes significance at 10%. Fixed-effects estimates are "two way", and permit the constant term to vary across countries and years (periods). *F*-statistics test the null of OLS being more appropriate than the fixed-effects format, and the null is rejected in all cases. Hausman *m* statistics test the null that random-effects format is more appropriate than fixed-effects model, and reject the null in all cases. *N* stands for the number of observations.
The sample excludes 19 countries for which missing data led to only one observation, and Taiwan, which is not included in World Bank (2007), and Singapore for consistency with Table 4.
"Constant term" in FE models is not meaningful; its estimates (as of country- and time-dummies) are not reported.

Table 6
Country size and openness and country size and government size: summary of core estimates from individual-country data

	Number of countries for which sign is		Mean value of estimated coefficient
	Negative	Positive	
Part A: Eq. (1) of the text: dependent variable is logarithm of government size: sign on the coefficient of LPOP and mean value of the coefficient estimates			
OLS	43	89	0.566
AR(1)	28	104	0.907
Part B: Eq. (2) of the text: dependent variable is logarithm of openness (LOPEN): sign on the coefficient of LPOP and mean value of the coefficient estimates			
OLS	45	87	0.157
AR(1)	45	87	0.130

Note. Government size is proxied by government consumption as percent of GDP, and population represents "country size". LPOP denotes logarithm of population. Logarithm of real GDP per capita in international dollars at (chained) constant prices is included as a control variable in all regressions. LOPEN is logarithm of ratio (percent) of imports+exports to GDP. These data are taken from PWT 6.1. All countries for which more than 10 observations were available have been included. The total number of countries is 132. AR(1) denotes estimates based on the error term being first-order autoregressive and the use of maximum-likelihood procedure in SAS.

fixed-effects format. The regional and oil-exporting dummies are obviously not needed. Country-area cannot be included since it does not vary over time. Also, three somewhat special variables (terms-of-trade shocks, import–duty ratio, and non-tariff barriers) lacked significance in almost all cases reported by them. Therefore, a sensitivity check is conducted by starting with their simplest specification and successively adding (a) logarithm of GDP per capita, (b) government size, and (c) population density which serves the same role as (logarithm of) country-area in their regressions.[7] As in Table 4, inclusion of government size should strengthen the sensitivity tests. Table 5 contains fixed-effects estimates for the four models of increasing richness from 10-year averaged observations. It may be seen that in no case there is an indication of a significant negative association between openness and country size. Except for the tiny (and insignificant) negative parameter in the simplest model, all coefficients of LPOP are positive, but none reaches significance.[8]

While Alesina and Wacziarg (1998) used cross-country data of the kind on which Tables 1, 2, 4 and 5 are based, it may be useful to consider in a preliminary manner individual-country data through the parsimonious specifications of Eqs. (1) and (2). Table 6 reports a summary of the core estimates from annual data for each of 132 countries that had more than 10 usable observations. It is evident that the mean values of the country-size (LPOP) parameters are positive for both models and bear a fair resemblance to the corresponding fixed-effects estimates in Tables 1 and 2. It is also notable that the positive signs are fairly pervasive, and the positive means are not driven by a small number of countries.

[7] Logarithm of density is not a good variable here since it equals logarithm of population minus logarithm of area which is constant over time for each country.
[8] Alesina–Wacziarg hypothesis postulates a negative covariation of country size with both government size and openness. Even if the association between openness and country size was negative, it will be inconsistent with their hypothesis so long as the covariation between government size and country size is positive.

The overall position may be summarized by saying that the panel-data fixed-effects models, which are preferred over OLS (and random-effects) formats, indicate lack of support for the Alesina–Wacziarg view that the negative association of country size with government size and openness is likely to generate the Rodrik-type positive association between government size and openness. The foregoing inference is suggested by estimates of Eqs. (1) and (2) from annual observations as well as 5-year and 10-year averaged data. The same scenario is shown by sensitivity checks conducted through fixed-effects estimates from 10-year averaged data of several specifications that start with the simplest and successively augment the model with most variables considered by Alesina and Wacziarg (1998, pp. 312, 316). Preliminary estimates from annual data for 132 individual countries also indicate the predominance of a positive sign on country size in models of government size and openness.

While the estimates indicate lack of support for Alesina–Wacziarg hypothesis, it may be of interest to consider why the population (country size) variable has a strong positive association with government size in fixed-effects estimates, but a negative association in OLS models. As already noted, since estimates from annual and 5-year and 10-year averaged data show the same pattern, it is not likely that the slow-growing population variable acts like the country-dummies and its role gets confounded in fixed effects. One possibility is that the negative sign in OLS estimates holds *across* countries and reflects some dimension of unobserved cross-country heterogeneity, while the fixed-effects estimates reveal more faithfully the average intracountry relation, which is of primary interest in the entire discussion.[9] The structure of the fixed-effects format implies that the estimates are likely to reveal an average intracountry relation, and the preliminary estimates from individual-country data reinforce that position. Moreover, within a typical country, it is possible that increasing population, which reflects increasing aggregate real GDP (in the presence of GDP per capita), represents a dimension of development which leads to a larger government size in terms of Wagner's well-known hypothesis.[10] The positive coefficients on urbanization and population density (and even openness) in Table 4 might also be deemed to reflect the same kind of relationship.[11]

3. Concluding observations

This study uses a large panel that contains data for 154 countries covering the 41-year period 1960–2000, and, using several specifications, revisits the propositions articulated by Alesina and Wacziarg (1998) and Rodrik (1998) in regard to the patterns of covariations between openness, country size, and government size. The estimates generally support Rodrik's (1998) hypothesis. The OLS estimates based on pooled annual observations as well as those from 5-year and 10-year averaged data support Alesina and Wacziarg (1998) in showing a highly significant negative association of country size with both openness and government size. However, fixed-effects format, which the relevant tests overwhelmingly prefer over OLS (and random-effects) models, does not support the Alesina–Wacziarg proposition. The country-size parameters are positive in both government-size and openness equations. That position holds in fixed-effects estimates based on annual data and also in those derived from 5-year and 10-year averages. Sensitivity tests conducted through fixed-effects estimates from 10-year averaged data for several alternative specifications of increasing richness also show lack of support for Alesina–Wacziarg hypothesis. Moreover, preliminary estimates from annual observations for 132 individual countries also indicate predominance of a positive sign on country-size parameter in models of government size and openness, and reinforce the fixed-effects panel estimates. Therefore, it seems unlikely that the positive covariation between government size and openness arises from a combination of negative association of country size with government size and openness. Of course, as is appropriate in scientific discourse, the foregoing conclusions are stated with a certain degree of humility, and there is nothing final about the position indicated by the reported patterns.

References

Alesina, A., Wacziarg, R., 1998. Openness, country size and government. Journal of Public Economics 69, 305–321.
Biehl, D., 1998. Wagner's Law: an introduction to and a translation of the last version of Adolph Wagner's text of 1911. Public Finance/Finances Publiques 53, 102–111.
Heston, A., Summers, R., Aten, B., 2002. Penn World Table Version 6.1, Center for International Comparisons at the University of Pennsylvania (CICUP), Baltimore, MD.
Rodrik, D., 1998. Why do more open economies have bigger governments? Journal of Political Economy 106, 997–1032.
White, H., 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica 48, 817–838.
World Bank, 2007. World Development Indicators CD-ROM 2007, Washington, DC.

[9] When country fixed effects from Eqs. (1) and (2) are regressed on logarithm of mean population for each country, the population (LPOP) parameter is significant and negative in both models. That might suggest that the negative associations between population and government size and openness in OLS estimates reflect a cross-country phenomenon that is taken out by the fixed-effects format, leaving mainly the intracountry relations.

[10] An authentic exposition of Wagner's hypothesis has been provided by Biehl (1998).

[11] It is somewhat surprising that these indicators of development support Wagner's hypothesis more than the parameter for real GDP per capita.