Democracy, Development, and the Public Sector

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This article develops a model that describes the growth of the public sector as a joint result of the process of economic development and the political institutions in place. The model is tested using panel data for about sixty five developing and developed nations for the period 1950–90. Economic modernization leads to the growth of the public sector through two mechanisms: first, the state intervenes to provide certain collective goods such as regulatory agencies and infrastructures; second, industrialization and an ageing population translate into higher demands for transfers in the form of unemployment benefits, health insurance, and pensions. Still, the impact of economic development is strongly conditional on the political regime in place as well as on the level of electoral participation. Whereas in a democratic regime, where politicians respond to voters' demands, the public sector grows parallel to the structural changes associated with economic development, in authoritarian countries the size of the public sector remains small.

Two stylized facts describe the evolution of the public sector across the world during the last century: first, its steady growth; second, the presence of persistent cross-national differences in its size. Excluding war times, government expenditure remained constant around 10 percent of GDP during the nineteenth century. Yet after 1914 the size of the public sector expanded dramatically. In OECD nations, total current public revenue had risen to 24 percent of GDP in the early 1950s. Thirty years later it had stabilized at around 44 percent. Among developing countries, current public revenue grew from 14 percent of GDP in 1950 to around 27 percent from the late 1970s onward.

Despite the steady growth of the public sector, differences across nations have remained substantial. In the mid-1980s, public revenue ranged from less than 10 percent of GDP in Sierra Leone and Paraguay to over 60 percent in Botswana, Kuwait, Reunion, and Sweden. Cross-national variation has become especially acute in the developing world over time. Whereas in the early 1950s the standard deviation of public revenue in non-OECD nations was 4 percent, by the mid-1980s it had reached 15 percent of GDP.

The growth of the public sector in the last century has spawned a vigorous literature on its causes.[1] Three families of explanations stand out. "Demand-side" explanations, conceiving the government as a provider of public goods, attribute the growth of the public sector either to social progress and demographic transformations (Wagner 1883; Wilensky 1975) or to different rates of productivity growth in the public and private sectors (Baumol 1967). "Political" or redistributive theories model the government as an agency that, responding to social conflict, redistributes income among citizens (Meltzer and Richards 1981; Esping-Andersen 1990). Finally, "institutional" models have stressed the impact of different structures of government, such as bureaucracies (Niskanen 1971), the structure of the legislative branch (Shepsle and Weingast 1981) or federalism, on the size of the public sector.

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[1]For extensive reviews see Lybeck (1988) and Holsey and Borcherding (1997).

The contemporary research on the causes of public spending suffers, however, from two fundamental weaknesses: the first one, empirical; the other one, strictly theoretical. To date most empirical studies are inconclusive (Alt and Chrystal 1983, chapter 8; Lybeck 1988; Mueller 1988, chapter 17; Holsey and Borcherding 1997). Most scholars use limited samples, such as one-country time-series analysis or a cross-section of countries, and focus on single policy measures.[2] Some recent studies have developed pooled time-series cross-sectional samples for (most) OECD nations (Pampel and Williamson 1988; Korpi 1989; Hicks and Swank 1992; Huber, Ragin, and Stephens 1993). Although they go a long way in determining the forces behind the growth of the public sector, several explanatory factors, such as left-wing rule, corporatism, openness, and the proportion of old population, are so well correlated that it is impossible to ascertain, first, which variable actually matters and, second, through what specific mechanisms it does. Their focus on OECD nations limits their applicability. Their sample of advanced democracies can only very weakly test for the effects of economic development, the impact of democratic (vs. authoritarian) regimes, and the influence of an unequal distribution of resources. To remedy these problems, this article relies on a broad sample of developed and developing nations. This sample includes all the countries for which comparable data on public revenue (current receipts) of the general government are available from 1950 to 1990. The sample includes about sixty-five countries (twenty-two are OECD members), with some fluctuations depending on the time period, and about 2,000 observations.[3]

The inconclusiveness of the research on the growth of the public sector stems as well from an inadequate theoretical specification of the current models. "Demand-side" theories, which rely heavily on the idea that politicians mechanically respond to the (changing) tastes of the median voter, discount the potential redistributive costs of taxation. In turn, purely political models concentrate too much on the effect that an unequal distribution of resources has on the tax rate to the extent of disregarding how economic development alters the underlying structure of preferences in the electorate. As a result, they cannot explain why per capita income is so well correlated with the size of the public sector.

To overcome these deficiencies, I develop a joint model that integrates both the impact of economic development and the underlying structure of political choice as follows. Economic development triggers pressures to enlarge the public sector in two ways. First, the processes of urbanization and industrialization generate incentives for the state provision of certain collective goods such as infrastructures and skill formation. Second, both the emergence of an industrial economy and an ageing population shift the underlying distribution of preferences in a way that results in stronger demands for public expenditure. The process of economic development constitutes, however, a necessary but not sufficient condition for the emergence of a large public sector. Policy-makers, who make policy through a political mechanism, choose the public sector that matches the preferences of the median voter. The identity of the latter varies conditional on the electoral franchise in place (as well as on the extent to which voters are mobilized). This variation shapes, in turn, the size of the public sector. Under a democratic regime, politicians respond to the demands of all voters and the public sector grows parallel to the structural changes due to the process of development. By contrast, in authoritarian systems, where all or a substantial part of the electorate is excluded from the decision-making process, precisely to avoid the redistributional consequences of democracy, the size of the public sector remains small.

Economic Development and Political Regime

The Political Setting

To examine how economic development and the underlying political system jointly determine the size of the public sector, I proceed in two steps. In this subsection I model the generic political setting through which the size of the public sector and hence the tax rate to finance it are decided. To do so, I rely on a model first derived by Meltzer and Richards (1981), to which I add the assumption of a general (nonredistributive) demand for public investment programs and public goods from citizens. In the next subsection I then show how the process of eco-

[2]For initial studies on a limited number of cases, see Titmuss (1958), Marshall (1963), Peacock and Wiseman (1961). For initial cross-sectional studies, see Cutright (1965) and Wilensky (1975) on advanced and developing nations, Jackman (1975) on American states, and Esping-Andersen (1990) and Cameron (1978) on OECD nations alone.

[3]Rodrik (1996) and Cheibub (1998) have recently built broader samples that encompass developed and developing nations. Rodrik (1996), however, employs public consumption as a percentage of GDP. This is too limited a tool to measure the size of the welfare state and provides highly biased results (given how important public consumption is among developing countries). Cheibub (1998) employs data on central government, which also measures very imperfectly total public expenditure (especially for large, closed economies, which tend to be decentralized), and focuses only on the tax capacity associated with different political regimes.

nomic development changes the underlying structure of preferences of voters and how these changes in turn modify, conditional on the political regime in place, the size of the public sector.

Consider an economy composed of individuals endowed with different levels of assets (such as skills and property). The income of each individual i is a positive function of his assets and can be represented as $y_i = y_i(\tau,k)$, where τ is the tax rate and k the level of public investment. On the one hand, the income of the individual is decreasing with the tax rate ($\partial y_i/\partial\tau < 0$), since devoting time to leisure rather than to work becomes more attractive as the tax rate increases. Moreover, higher incomes are more sensitive to tax rates than lower incomes—in other words, the leisure-work substitution effect becomes steeper with incomes ($\partial^2 y_i/\partial\tau < 0$). On the other hand, public investment, that is, policies to pay for infrastructures, human capital formation, and regulatory agencies that enforce the rule of law and secure property rights, raises the productivity of factors, thus increasing individual income ($\partial y_i/\partial k > 0$). The intensity with which public investment affects individuals' returns varies with the level of income. For very low levels of income, public investment increases the marginal productivity of labor either very slightly or not at all—extensive road-building in subsistence farming economies hardly changes the level of development. Beyond a certain income threshold, k's returns are increasing ($\partial^2 y_i/\partial k > 0$). At very high levels of income, the marginal return to public investment tapers off ($\partial^2 y_i/\partial k < 0$).

The state taxes economic agents through a linear tax τ on their income y. The resulting public revenue is then allocated in two ways. A certain proportion λ is equally distributed among all individuals, so that $\lambda\tau y_a$ is given to each i, where y_a is the average income or $y_a = \sum_i^N y_i/N$. The rest, $(1-\lambda)\tau$, is spent on public investment.

The public budget is always balanced, that is, the expenditure on investment and transfers equals total revenue:

$$\tau\sum_{i=1}^{i=n} y_i(\tau,k) = \lambda\tau Ny_a(\tau,k) + (1-\lambda)\tau\sum_{i=1}^{i=n} y_i(\tau,k) \quad (1)$$

The utility of each agent i depends on three components: initial income (affected by the proportion of the tax directed to finance public investment); the net transfer received from the government (that is, the lump sum received from the state minus the portion of the taxed income directed to finance the redistributive program); and, finally, the proportion of the income taxed to finance public investment programs. Formally:

$$U_i = \ln[(1-\tau)y_i(\tau,k) + \lambda\tau y_a(\tau,k)] \quad (2)$$

Given that voting takes place over the tax rate and that preferences are related to pre-tax individual income (and hence single-peaked), the tax rate will correspond to the ideal policy of the median voter. That is, policymakers will choose the tax rate that maximizes the well-being of the last voter needed to form a majority.[4] Maximizing (2) with respect to τ, subject to the budget constraint, gives us the ideal tax rate of the median voter:

$$\tau_m = -\frac{\lambda y_a(\tau,k) - y_m(\tau,k) - \left[\dfrac{\partial y_m}{\partial\tau} + \dfrac{\partial y_m}{\partial k}\dfrac{\partial k}{\partial\tau}\right]}{\lambda y\left[\dfrac{\partial y_a}{\partial\tau} + \dfrac{\partial y_a}{\partial k}\dfrac{\partial k}{\partial\tau}\right] - \left[\dfrac{\partial y_m}{\partial\tau} + \dfrac{\partial y_m}{\partial k}\dfrac{\partial k}{\partial\tau}\right]} \quad (3)$$

The following assumptions, embedded in the model, make sure that an interior τ_m exists. First, the overall income distribution is unequal (as a result of different asset endowments) and skewed to the top, that is, the income of the median voter is lower than the average income ($y_a > y_m$), and, as a result, the median voter will always vote for (or will be promised by politicians) a tax to redistribute income from the high-income voters to himself. Second, voters with higher incomes are more sensitive to taxes than voters with lower taxes ($\partial y_a/\partial\tau < \partial y_m/\partial\tau < 0$), which ensures that $\tau_m > 0$. Third, for a full tax on income ($\tau = 1$), output drops to zero, and as a result the median voter will always vote for $\tau < 1$. Finally, the tax rate is only increased to the points the transfers it generates compensate any decrease the tax raise may cause on the median voter's income.

From this political set-up, two general results follow. First, the level of the tax rate will depend on the difference between the average income and the income of the median voter. The larger the difference, that is, the more unequal the overall income distribution, the more interested in redistribution the median voter will become and the higher the tax rate will be. Still, the tax rate that the median voter (or the median parliamentarian) approves will stop short of fully equalizing incomes across voters. Since higher taxes and redistribution reduce the incentive to work and, with that, lower pre-tax income, from which transfers are financed, the median voter will vote for a tax rate to the point in which the available amount of transfers declines.

[4]On the validity of median voter models, see Alesina and Rosenthal (1995), chapter 2, for plurality systems. For proportional representation systems and the systematic participation of the median parliamentarian in coalition governments, see Laver and Schofield (1990).

Second, the tax rate will be affected by the proportion spent on investment $(1 - \lambda)$ since this increases the productivity of workers. The median voter will choose the λ such that the marginal benefit she derives (through her income) from the last unit being spent on public investment equals the net benefit she derives from transfers. In other words, λ will be chosen at a value in which the combined increase in the median voter's income due to public investment and to the expansion of total output (which implies a larger pool available for redistribution) equals the increase derived from the last unit received in transfers. Formally, maximizing (2) with respect to λ, the solution is:

$$\lambda = -\left[(1-\tau)(\partial y_i/\partial\lambda) + \tau y_a(\tau,k)\right]/\tau(\partial y_a/\partial\lambda) \quad (4)$$

The Dynamic Path of the Public Sector: Economic Development and the Political Regime

With the set of mechanisms predicted above in mind, consider now the two main channels through which the process of modernization, by altering the distribution of income across the population, pushes the size of the government upward.

In the first place, the public sector expands directly as a result of the process of economic development.[5] As discussed in the previous subsection, above a certain income threshold, an increase in the provision of collective goods and public investment has strong effects on the productivity of factors. Accordingly, as the economy and per capita income start to grow, the incentive of policymakers to raise the supply of capital and public goods will increase. Most public investment, generated to reap the benefits of development, will take place independently of the political regime in place (or, more precisely, of the actual location of the median voter on the income scale).[6] Still, the type of political regime may affect the extent of public investment partially in the following way. Assuming that authoritarian regimes exclude the poorest voters from the policy-making process, the me-

dian voter in a nondemocratic system is richer than the median voter in a full democracy. Accordingly, at the same level of development (for the same distribution of income across individuals), the incentive to invest is higher in an authoritarian regime than in a democracy. As incomes increase, however, and given that the marginal return for public investment declines at high per capita income levels, the differences across regimes (resulting from differently located median voters) in public investment rates should vanish.

In the second place, the level of tranfers and thus the size of the public sector change as development alters the underlying distribution of assets across society as follows. At low levels of development, the public sector remains marginal in the economy. This takes place for two alternative reasons. On the one hand, in underdeveloped yet relatively equal countries, the pressure to redistribute is limited—in line with the predictions of the Meltzer and Richards' model. In this type of premodern society, which constitutes the standard account of modernization, peasant families own roughly similar plots of land and are affected by similar risks. Even though they are not universal, communal arrangements to share risk— such as common lands or church-distributed benefits— and the use of extended families for the provision of food, shelter, and care may be fairly extended. These family- and community-based risk-sharing mechanisms substitute for the state. Hence, even if a full democracy is in place, the public sector remains small. On the other hand, in underdeveloped and unequal societies, such as those characterized by a strong cleavage between landowners and a mass of landless peasants, although redistributive pressures are strong, they do not generally translate into a larger public sector. In such a society characterized by a substantial skew in the distribution of incomes, the upper segment of the income distribution, anticipating the distributional consequences of democracy, blocks the introduction of democracy. With a limited franchise, the distance between the average income and the median voter's income stays small or even negligible, and the public sector is kept small. In short, at low levels of economic development, only low tax rates should prevail, either because redistributive pressures are low or because they have been suppressed by force.

Economic development alters the structure of social relations, shifting the underlying sources of distributive conflict, with the following consequences. On the one hand, overall inequality (whenever it was high) declines, lessening a fundamental source of political conflict, and

[5]For discussions of the process of economic modernization, see Flora and Alber (1981). For a critical examination, see Esping-Andersen (1990). For a first analysis of its impact on the public sector, see Wilensky (1975).

[6]It is true, however, that policy-makers cannot be automatically assumed to behave as social planners. The implementation of optimal policies will only happen under political or legal institutions that effectively restrain rent-seeking behavior among politicians. Democratic institutions, by easing the task of monitoring policymakers, may, on average, lead to a fuller provision of public goods. For a discussion of this point, see Olson (1993) and Przeworski and Limongi (1993). In the model developed in this article, politi-

cians automatically react to the demand for productive expenditure as determined by the level of income.

the likelihood of a democratic regime goes up. Recent data collected by Deininger and Squire (1996) on income inequality, consisting in 692 comparable observations (587 of them with Gini coefficients) show that, at low levels of economic development, the degree of inequality is highly variable across countries. For economies under a per capita income of $5,000, the mean Gini index is 42.5 with the values ranging from 20.9 to 66.9 and a standard deviation of 10.4. At higher levels of economic development, the occurrence of inequality diminishes. In economies with a per capita income of more than $10,000 (constant prices of 1985), the average Gini index is 34.2 with a standard deviation of 3.6. As recently shown in Przeworski and Limongi (1997), whereas the probability of having a democracy is lower than 0.25 in countries with a per capita income of $2,000, it rises to over 0.75 for per capita incomes higher than $7,000.[7]

On the other hand, technological breakthroughs and the expansion of manufacturing and service-oriented jobs transform the old economic structure with the following consequences. In the first place, the distribution of economic risk changes, concentrating in specific segments of the population. More precisely, unemployment spells and work-related accidents, which emerge as the downside of manufacturing-led productivity increases, become important among industrial workers, particularly those most unskilled. In other words, the process of industrialization and the formation of a broad class of wage-earners results in stronger pressures for *intra-generational transfers.*

In the second place, a general improvement in material conditions and in health technologies in particular prolongs life expectancy and eventually leads to a shift in the demographic structure. As the profile of the population matures and the proportion of old cohorts expands, pressure for *inter-generational transfers*, in the form of pensions and health care programs, goes up. Broadly speaking, whereas the pressure for intra-generational transfers is a contemporary phenomenon to industrialization, the ageing of the population occurs at a later stage in modern societies.

Against this background of extraordinary social and economic change, the level of transfers and hence the tax rate are strongly shaped by the political regime in place. In democratic regimes, where newly mobilized groups (such as unionized workers) can successfully press for their demands, the size of the public sector increases rapidly. By contrast, under authoritarian regimes or restricted democracies, redistributive programs remain minimal.

Finally, the model allows for a related prediction. As turnout declines among the least skilled voters, the public sector should shrink even if the franchise is universal. In other words, in the limit, that is, with all voters abstaining, the size of the public sector in a democracy should be similar to the public sector in an authoritarian system.

Wagner's Law and Baumol's Cost Disease

The theoretical explanation developed in the article differs from both Wagner's Law and Baumol's Cost Disease, which have constituted the two most common explanations employed to link economic modernization to the size of the public sector.

Strictly speaking, Wagner's law states that public expenditure rises with social progress because the types of goods and services provided by the public sector have a high income elasticity of demand. This explanation, which treats per capita income as a black box (a problem this article attempts to overcome) and disregards how voters react to the tax burden of more public spending, has found very scant support in previous empirical analyses (Ram 1987).[8]

In turn, the so-called Baumol's cost disease predicts that the combination of similar real wages increments in both the public and the private sectors and a lower productivity growth rate in the public sector (which is a service sector and hence a relatively labor-intensive industry) compared to the manufacturing sector leads to an increase of the costs of government services in real terms over time (Baumol 1967). Although Baumol only claims that (public employment and) public sector costs should grow over time in absolute terms, researchers on the growth of the public sector have often concluded that this should entail as well a rise in the relative size of the government in the economy.[9] As formally shown in

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[7]As is apparent, this article treats the choice of the democratic regime as exogenous. For a formal model in which democracy is derived from the gains (or losses) that political agents confront under different regimes (which are, in turn, an outcome of the pattern of income distribution) and from the resources they have to impose their preferred solution, see Boix (2000). In that paper, empirical evidence is also offered to show how the pattern of income distribution appears (jointly with economic development) as a fundamental variable to explain the type of political regime.

[8]A broader version of Wagner's Law is basically similar to any modernization theory explanation and relates the growth of the public sector to the transformation of the traditional society into an industrialized economy. This much broader understanding of Wagner's Law finds some partial accommodation in the model developed here. For a discussion, see Lybeck (1988).

[9]For the use of Baumol's model in this direction, see Holsey and Bordering (1998: 568–569) and the references cited therein.

Appendix A, this extension of Baumol's work is inaccurate. The higher productivity of manufacturing private sector may lead to a higher wage bill in the public sector. But the differential in productivity (which expands the tax base to finance the state) prevents the public sector from automatically taking a bigger share of the economy.

Data and Methods

Sample

To examine the strength of the theories reviewed in the first section, I build a sample that includes all the countries for which comparable data on public revenue (current receipts) of the general government are available from 1950 to 1990. Two sources have been used to build this sample: the United Nations National Accounts (UN, several years) and the OECD National Accounts. The data starts in 1950 and approximately covers sixty-five countries (twenty-two are OECD members), with some variation in the years covered, providing about 2,000 data points. See Appendix B for a description of the sample.

Dependent Variable

The dependent variable is *current receipts* of the *general government*. Current receipts have been chosen over public expenditure to maximize the sample under analysis. The United Nations National Accounts offer less comprehensive data on public disbursements. Although two databases offer larger samples for parts of public expenditure, they are not well suited for the purposes of this article. The Penn World Tables report the share of government consumption of over a hundred countries—but government consumption represents a fraction of all government spending. The World Bank's *World Data 1995* reports levels of overall government spending for over eighty countries. Still, the World Bank's *World Data* (as well as the IMF data) reports spending only at the central government level—which leads to rather biased values for countries such as Argentina, India, or the USA.

Model and Independent Variables

In order to determine which variables influence size of government, I estimate the following model:

$$\text{Public Revenues} = \alpha + \alpha_1(\text{Economy}) + \alpha_2(\text{Trade})$$
$$+ \alpha_3(\text{Political Institutions})$$
$$+ \alpha_4(\text{Economy*Political Institutions}) + \varepsilon_t$$

1. "Economy" includes the set of variables that measure the effects of economic modernization on the size of government:
   (a) The log value of real per capita income (in constant dollars, Chain Index, expressed in international prices, base 1985, taken from the Penn World Tables), that proxies for the shifts in the distribution of preferences associated with economic development, is expected to have a positive effect on the size of the public sector.
   (b) The average share of the agricultural sector over GDP in 1970–90, taken from the World Bank, and expected to enter negatively in the model.
   (c) The "old-age dependency ratio," that is the number of years life expectancy goes beyond 60, in 1970–90; life expectancy is taken from the World Bank. This variable, which tracks the shift of the median voter to an older age, should affect positively the size of government.[10]
   (d) The Gini index, to measure the existence of redistributive tensions, taken from Deininger and Squire (1996).

2. "Trade," which may increase the risks associated with the international business cycle and hence political pressures for publicly-financed compensatory programs in favor of the exposed sectors. This variable, which has been found to be a strong predictor of public sector (see Cameron 1978; Rodrik 1996), is measured through:
   (a) the log value of the ratio of trade (sum of imports and exports) to GDP, and is taken from the Penn World Tables;
   (b) the ratio of fuel exports over total exports, for 1970–90, taken from World Bank tables;
   (c) and the proportion of nonfuel primary exports over total exports, for 1970–90, taken from World Bank tables.

3. "Political Institutions" includes:
   (a) The variable "Democratic Regime," which indicates whether each country was a competitive democracy in the five previous years—and thus ranges from 0 (no democracy ever) to 1 (democracy always). To measure the presence of a democratic regime, I follow the index developed by Alvarez et al. (1996) and the classification reported in Appendix A of their paper. Democratic regimes are defined as those regimes "in

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[10] The "old-age dependency ratio" (ODR) is calculated as follows. ODR = Life expectancy (LE) − 60 if LE > 60, ODR = 0 otherwise. This variable is used over the proportion of the population over 60 to maximize the number of observations. ODR and the percentage of old population are highly correlated (with the correlation coefficient of 0.82).

which some governmental offices are filled as a consequence of contested elections" (Alvarez et al. 1996, 4).[11]

(b) "Level of Turnout in Democracies," which is an interactive term of "Turnout" and "Democratic Regime." The variable "turnout" is defined as the proportion of those voting over all those citizens over the legal voting age and is taken from IDEA (1997) and has been calculated for each year on the basis of data from elections that have taken place in the previous five years. Both democracy and the level of turnout are expected to increase the size of the state.

(c) The following three variables to capture the extent to which different constitutional arrangements distort the representation of the median voter's preferences: (i) a dummy variable for the presence of presidential regimes; (ii) a dummy variable coding the use or not of a proportional representation electoral system; and (iii) a dummy variable that captures the existence of a federal system. The first two variables have been built based on Cox (1997), IDEA (1997), Linz and Valenzuela (1994), Shugart and Carey (1992) and the *Keesing's Contemporary Archives*. The variable on federalism follows Downes (2000).

4. Although the process of modernization generates, on its own, strong pressures to increase the public sector, the thrust of the model predicts that the size of government will go up conditional, to a large extent, on the political regime in place. Excluding the provision of public goods, the public sector will remain small in authoritarian regimes. In democratic regimes, instead, governments will meet the demands for transfers fostered by the economic and demographic changes, and the size of the public sector will increase. To capture this prediction I introduce the interactive term "Economy*Political Institutions" in which economic development is alternatively measured through per capita income, share of agriculture, old-age dependency ratio, and Gini index, and where political institutions are both democratic regime and level of turnout in democratic regime. The expecta-

tion is that the interactive term will have a positive impact on the size of government.

Following Beck and Katz's procedure, I have estimated the pooled cross-sectional time- series model through ordinary least squares, adjusting the standard errors for unequal variation within panels and correcting for autocorrelation.[12]

Sample Periods

The analysis has been conducted on two data periods, due to the availability of data: (1) The first data set includes observations for the period 1950–90 and the following independent variables: real per capita income, sum of exports and imports over GDP, and political variables. Results are reported in Table 1. (2) A second data set, restricted to the period 1970–90, adds the remaining independent variables listed in the previous section (and for which data only starts in 1970). Results are reported in Tables 2 and 3.

EMPIRICAL RESULTS

The Impact of Development and Democratic Institutions

Table 1 examines the impact of the main variables of the model, economic development or modernization, political regime, turnout, and their interaction, on current public revenues for the period 1950–90. It also includes a control for trade openness and tests for the impact of different constitutional arrangements on the size of the state.

Both economic development and trade openness, which are strongly significant from a statistical point of view, affect positively the size of government. As discussed above, the impact of socioeconomic modernization is to a large extent conditional on the political regime and level of participation. Column 1 introduces the interactive term "Democratic Institutions*(Log of) Real per Capita Income."[13]

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[11]I have also regressed the dependent variable on a variable that indicates whether each country was a "bureaucracy" each year; a variable that indicates whether each country was an "autocracy" each year; and a variable that indicates whether each country was independent each year. Bureaucracies are those dictatorships that have legislatures. Autocracies are those dictatorships that do not and that therefore can be thought of as not having any sort of institutionalized rule for operating the government. The presence of autocracies and bureaucracies is also based on the index developed by Alvarez et al. (1996).

[12]Estimations in Tables 1 through 3 have been implemented through Stata's xtpcse procedure. Autocorrelation has been modeled as a first-order process with a common coefficient for all panels. Results do not change with panel-specific autoregressive terms. Moreover, the following tests have been developed to ensure the robustness of results: country-by-country and year-by-year deletions as well as introduction of dummies by regional areas. Results were robust to this procedure except where noted.

[13] The United Nations National Accounts do not include data on the size of the public sector in former socialist countries. Using data from IMF (several years), I have run the same regressions in

TABLE 1 **The Size of Governments across the World**

Independent Variables	Public Revenue as Percent of GDP, 1950–1990	
	(1)	(2)
Constant	−27.71***	−28.01*
	(7.87)	(8.79)
Per Capita Income	4.62***	5.10***
(Log)[a]	(1.05)	(1.14)
Trade Openness (log of sum of	3.77***	2.52***
exports and imports over GDP)[b]	(0.57)	(0.62)
Democratic Regime[c]	−14.81^	2.36 ^
	(8.87)	(1.99)
Democratic Regime*	2.16***	
Log of Real Per Capita Income	(1.15)	
Level of Turnout in Democratic Regimes		−0.30**
		(0.14)
Level of Turnout*		0.04**
Log of Real Per Capita Income		(0.02)
Proportional Representation in Democracies	1.72	1.77*
	(1.08)	(0.98)
Presidential Regime in Democracies	−3.87***	−3.84***
	(1.17)	(1.12)
Federalism in Democracies	−0.55	0.05
	(1.22)	(1.28)
Model Chi-square	533.99	540.90
Prob>Chi-square	0.0000	0.0000
R^2	0.667	0.778
Number of observations	1975	1384

[a]Per Capita Income. Log of per capita GDP in $ in 1985 constant prices. Source: World Penn Tables.

[b]Trade Openness. Log of the sum of exports and imports over GDP. Source: World Penn Tables.

[c]Democratic Regime. Five-year average of democratic institutions. Variable goes from1 (democracy in previous 5 years) to 0 (non-democracy in the previous five years). Average calculated from data in Alvarez, Cheibub, Limongi and Przeworski (1996).

Estimation: Ordinary last squares estimation , with panel corrected standard errors, and correction for autocorrelation and for heteroskedastic disturbances between panels.

Standard errors in parenthesis.

*p < 0.10; **p < 0.05; ***p < 0.01

^In joint test with level of turnout in democracies, statistically significant (Prob > chi2 = 0.0000).

To interpret the results of Column 1, Table 1, and particularly the effect of the interactive term, I simulate in

Table 1 including total revenues of general government in Hungary (1981–89), Poland (1984–88), Yugoslavia (1971–89), and Romania (1972–89). No data are available for China, East Germany, the USSR, and other non-European socialist countries. These regressions, with and without a dummy variable for "planning economies," generate estimates very similar to the results obtained without any planning systems. The dummy for planning economies indicates that the size of the public sector is about 20–25 percentage points of GDP larger in socialist economies. From a theoretical point of view, we may want to conclude that since the elasticity of income (y_i) to tax (τ) is much lower in countries that have socialized the means of production, the state taxes more heavily there.

Figure 1 the evolution of current public revenue as a proportion of GDP as real per capita income rises under both a democratic polity and an authoritarian regime (trade openness has been set equal to the sample mean of 62 percent of GDP). The structure of the simulation in Figure 1 suggests the following stylized facts. In the first place, the level of development has, again, an unconditional impact on the size of the public sector. At low levels of development, the public sector is small. Democratic India, the authoritarian regimes of sub-Saharan Africa or Central America or even the limited democracies of nineteenth-century Europe fit into this pattern. The state then grows with per capita income. Regardless of the political regime

FIGURE 1   The Evolution of Public Revenue as an Interaction of Economic Development and Political Regime

Per Capita Income (1985 US $)

— The Public Sector Under a Democratic Regime
- - - - The Public Sector Under an Authoritarian Regime
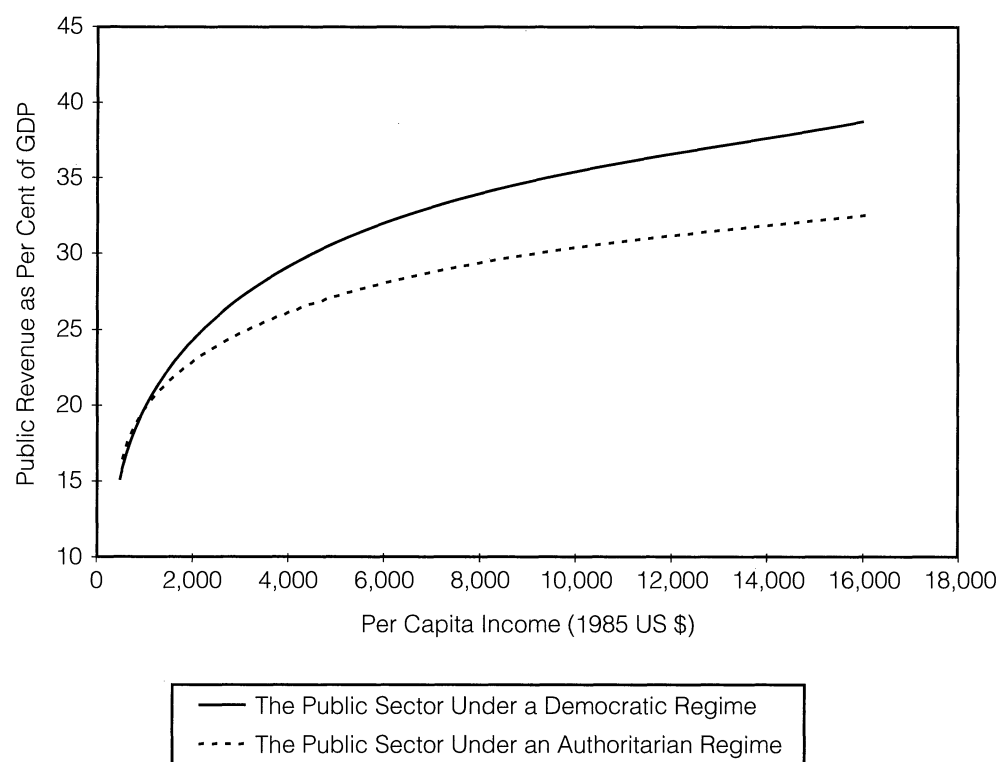
in place, the size of public revenues increases by around 10 percentage points from very low to medium levels of development, and then another 5 percentage points from medium to high levels of development.

In the second place, the nature of the political regime does not affect, on its own, the size of the government. For that to be true, the public sector should always be larger under a democratic system at all income levels. The results show, instead, that democratic regimes in truly underdeveloped economies have no incentives to spend more than authoritarian regimes. At extremely low levels of development, public current revenue is, in fact, somewhat higher in nondemocratic regimes. At a per capita income of $250 (in 1985 prices), public revenue is almost 3 percent lower in democracies than in authoritarian regimes. This is due to two factors. First, the demands for transfers associated with development have not affected democratic states. Second, authoritarian regimes, with their comparatively richer median voters (in relation to democracies), have slightly more incentives to spend on capital formation. It is also likely that authoritarian states are more expensive due to their need to finance their repressive apparatus.

Finally, as socioeconomic modernization takes off, democratic institutions lead to larger governments. The

latter generates a set of demands and needs that democratic politicians need to respond to. Once real per capita income goes over $1,000, the public sector expands at a faster rate under democratic regimes. With a per capita income of $ 6,000, public revenue is about 4 percentage points higher in a democratic country. For a per capita income of $12,000, public revenue would hypothetically be 6 percentage points higher in a democracy. The historical experience of recent democratic transitions fits these results quite nicely. Consider the paradigmatic case of Spain, where democracy was reestablished in the late 1970s. In 1974, Spain had a per capita income of $7,291 (in 1985 prices) and its current public revenue amounted to 22.8 percent of GDP. Ten years later, although per capita income had remained stagnant (it was $7,330 in 1984), current public revenue had risen to 32.7 percent.[14]

According to the model in section 1, who actually votes should matter as much (or even more) than who is

[14]In the sample I use, other countries that went through a democratic transition exhibit a similar pattern of behavior. This is case of Greece and Portugal among OECD nations. Among non-OECD nations, in Philippines, for example, current public revenue went up from 14 percent of GDP to 19 percent of GDP after the restoration of democracy in the late 1980s without per capita income changing in that period.

FIGURE 2   The Evolution of Public Revenue as an Interaction of
Economic Development and Democratic Participation
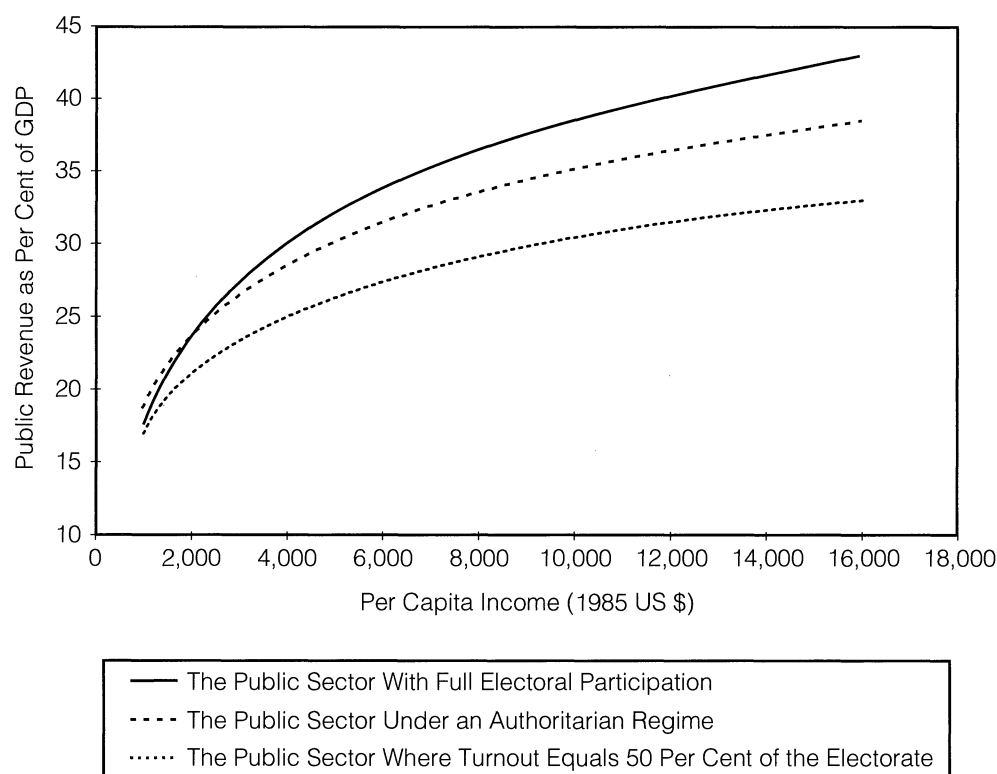
legally entitled to vote. Changes in the level of turnout may shift the position of the median voter and hence affect the tax rate. Since individual data on participation are unavailable for all the countries in the sample, this hypothesis can only be tested using national levels of participation. Nonetheless, given that, holding other things constant, the individual probability of voting has been shown to increase with income, it is plausible to conclude that as national turnout declines, abstention mostly takes place among the poorest voters.[15] Hence, at lower levels of participation, the difference between median voter income and average income should decline and the size of the public sector should shrink.

Column 2 in Table 1 considers the effect of the interactive term of turnout and per capita income.[16] The coefficient is again significant and strongly confirms the theoretical model. Using the coefficients in Table 1, Column 2, Figure 2 simulates the impact of different levels of turnout under different conditions of development.

Again, in underdeveloped countries, participation has no impact. For mid-income nations, however, turnout becomes substantially important. For high levels of per capita income, the size of the public sector varies from 37.5 percent of GDP in countries where only two fifths of the population vote (the cases of the USA or Switzerland) to about 43 percent where everybody votes.[17]

As noted above, Table 1 also tests the impact of presidentialism, proportional representation, and federalism. Federalism has no impact on the size of the public sector. From a theoretical standpoint, the impact of proportional representation on the size of the public sector is unclear. On the one hand, it has been pointed that while in plurality systems politicians can target a few marginal districts with very narrowly designed redistributive programs, parties need to please a large number of voters (across the entire country) under proportional representation (Persson and Tabellini 1998). Yet, on the other hand, provided that the population is similarly distributed across the country, all parties should be expected to (partly) converge to the median voter under the two systems and thus implement similar policy pro-

[15]For evidence that, on the absence of mechanisms of political mobilization, such as parties or unions, turnout is positively related to income, see Rosenstone and Hansen (1993) and Franklin (1996).

[16]The introduction of the variable "Level of Turnout" shrinks the sample by almost 600 observations.

[17]For recent evidence on the impact of turnout on the size of transfers using the sample of OECD nations, see Franzese (1998).

grams.[18] Table 1 shows that the public sector is slightly larger in countries governed under proportional representation laws—by about 1.7 percent of GDP—but it is not significant in Column 1 (which employs the largest sample).[19] By contrast, presidentialism has a significant negative effect on the size of the public sector. Under presidential systems, public revenues are around 4 percent of GDP lower than under parliamentarian regimes. Although presidentialism significantly depresses participation (by over 12 percentage points in my estimations on the sample of this article), its effect does not wane once we control for turnout. The separation-of-powers structure that comes with presidentialism seems to impose a status-quo bias on current policy that slows down the growth of government.[20]

The Mechanisms of Development

As discussed in the theoretical part, economic development or, more generally, modernization constitutes a complex phenomenon that alters the distribution of risk and income across sectors and generations. In the previous subsection, the level of development, measured using per capita income, was employed to some extent as a proxy to estimate how economic modernization affected, through the mechanisms spelled out earlier, both the

provision of public goods and the demands for redistributive programs.

In both this subsection and the following one, I attempt to unpack the effects of development using more direct measures that capture the change in the underlying distribution of preferences due to the growth of a manufacturing working class (leading to larger intragenerational transfers) and the aging of the population (resulting in an expansion of intergenerational transfers). More generally, I also consider the effect of the overall level of income inequality. Since observations for those measures are more scarce than per capita income data, the data set dwindles to between a half and a third of the initial sample. Although the results are in line with the model of the article, it is important to have in mind these data constraints when examining the estimations.

Table 2 examines the impact of both industrialization and demographic changes on the size of the government for the period 1970–90. In Column 1 I add two factors, the share of the primary sector in the economy and the old-age dependency ratio, and its interaction with democratic regime to the initial model estimated in Table 1—I exclude here the variables of proportional representation, presidentialism, and federalism to maximize an already smaller sample. Since per capita income, size of the primary sector and life expectancy are strongly correlated—for any given year, the size of the primary sector and old-age dependency explain around of 80 percent of the variance in the log of per capita income—I drop the level of per capita income in Column 2. In both columns the two new variables perform as expected.

Consider the results in Column 2 in Table 2. The weight of the primary sector in the economy has a substantial impact on the evolution of the size of the public sector. A decrease of one percentage point of the agricultural sector in the GDP implies an increase of public revenue of 0.30 points of GDP. With all the other variables at their mean level, public revenues would amount to around 36 percent in a country with no agricultural sector and to about 18 percent in a country with two-thirds of the economy in the primary sector. Modernization, by changing the types of productive activities most of the population is engaged in and bolstering an urban working class, accounts for much of the emergence of a significant public sector. Notice also that, as predicted in the model, the process of industrialization translates faster into a bigger government under a democracy: the public sector grows by another 0.17 points for each percentage drop in the size of agriculture.

The proportion of old population has, in turn, a strong positive effect on the size of government—confirming the standard literature on the determinants of

[18]It is true that whereas under proportional representation, the median parliamentarian will be always close to the median voter, under plurality one should expect more variability in government composition. But over time, that is, on average, policy location should be the same given similar electorates.

[19]The coefficient of proportional representation oscillates in size when we exclude specific years or countries. Proportional representation seems to affect the size of government mostly in an indirect way: by reducing barriers to entry and diminishing the incentive to vote strategically, it boosts political participation—a well-known result in the literature on electoral turnout (Franklin 1996)—and therefore makes government more responsive to citizens' demands. Controlling for economic development, degree of party competition, and other institutional characteristics (presidentialism and federalism), turnout is around 9 percentage points higher in proportional representation systems in the data set used in this article. When turnout is excluded from Column 2 in Table 1, proportional representation becomes statistically significant and goes up to 2.4.

[20]For a different interpretation of the impact of presidentialism, see Persson and Tabellini (1998). Using a much smaller sample (a cross-section of about fifty countries), Persson and Tabellini estimate that presidential systems depress public expenditure by about 10 percent of GDP. They attribute its negative effect to the fact that, by sharpening the extent of potential conflict among politicians, a separation of powers system enables voters to discipline politicians and therefore to reduce the level of rents. Their theoretical explanation is, however, unconvincing. The size of rents appropriated by politicians *through the budget* cannot account for this differential between presidential and parliamentarian regimes.

TABLE 2 **The Size of Governments across the World: The Mechanisms of Modernization**

Independent Variables	Public Revenue as Percent of GDP, 1970–1990		
	(1)	(2)	(3)
Constant	−22.05**	11.46***	17.51***
	(10.12)	(3.47)	(4.57)
Per Capita Income (Log)	4.12***		
	(1.22)		
Share of Agricultural Sector in GDP[a]	−0.20***	−0.30***	−0.33**
	(0.07)	(0.07)	(0.14)
Old-Age Dependency Ratio[b]	−0.05	0.17^	0.30^
	(0.21)	(0.19)	(0.25)
Trade Openness [c]	4.92***	4.76***	2.76***
	(0.73)	(0.75)	(0.81)
Democratic Regime	2.46	4.37^	−7.42
	(2.93)	(2.76)	(8.55)
Democratic Regime* Share of Agricultural Sector	−0.14^	−0.19**	0.57*
	(0.11)	(0.10)	(0.32)
Democratic Regime* Old-Age Dependency Ratio	0.17^	0.17^	0.22^
	(0.21)	(0.21)	(0.58)
Level of Turnout in Democratic Regimes			0.13
			(0.10)
Level of Turnout* Share of Agricultural Sector			−0.01***
			(0.00)
Level of Turnout* Dependency Ratio			−0.001^
			(0.007)
Proportional Representation in Democracies			5.53***
			(1.12)
Presidential Regime in Democracies			−4.45***
			(1.39)
Federalism in Democracies			1.67
			(1.44)
Model Chi-square	374.28	330.19	418.10
Prob>Chi-square	0.0000	0.0000	0.0000
R[2]	0.798	0.790	0.855
No. of observations	972	972	697

[a]Share of Agricultural Sector. Percentage of GDP from agricultural sector. *Source:* World Bank Tables.

[b]Dependency Ratio. Life Expectancy. *Source:* World Bank Tables.

[c]Trade Openness. Log of the sum of exports and imports over GDP. *Source:* World Penn Tables.

Estimation: Ordinary last squares estimation , with panel corrected standard errors, and correction for autocorrelation and for heteroskedastic disturbances between panels.

Standard errors in parenthesis.

* $p < 0.10$; **$p < 0.05$; ***$p < 0.01$

^In joint test of share of agricultural sector or dependency, democratic institutions and the interactive term, statistically significant (Prob>chi2 = 0.0000).

the welfare state in OECD nations. For each year life expectancy increases beyond 60, the public sector goes up 0.17 percentage points of GDP (Column 2)—only 0.05 points if we maintain per capita income (Column 1). The aging of the median voter has a very substantial impact conditional on the political regime in place. In

democratic regimes, each year of life expectancy beyond 60 adds another 0.17 percentage points to the public sector.[21]

Finally, Column 3 in Table 2 adds the variables of turnout, alone and in interaction with agriculture and old-age dependency ratio, as well as the controls for institutional arrangements. This specification corresponds to the model presented in Column 2, Table 1. Agriculture depresses and an old population increases the size of the public sector. Interestingly, the effect of industrialization on the public sector becomes more intense through turnout rather than democratic regime.[22] In turn, an aging population continues to have a much stronger impact in democratic regimes—higher levels of turnout in combination with a higher old-age dependency ratios actually reduce public revenue, although the impact is negligible.[23]

Income Inequality and the Public Sector

Table 3 examines the direct impact that income inequality has on the size of the public sector. To measure inequality, I employ the data set collected by Deininger and Squire (1996). For the estimation, I have done two things. First, I have employed an adjusted Gini coefficient (that varies in a scale from 0 to 100) to control for cross-national variation in the methods used to measure income distribution. This variation is a function of the choice of the recipient unit (individual or household), the use of gross versus net income, and the use of expenditure or income. Following the suggestions of Deininger and Squire, the adjusted Gini is equal to the Gini coefficient plus 6.6 points in observations based on expenditure (versus income) and 3 points in observations using net rather than gross income. Second, I have calculated a five-year moving average of adjusted Gini coefficients. This procedure has two advantages: it minimizes the volatility in the inequality measures; and it doubles the number of observations (on which the estimation of Table 3 is based) from 312 to 617 data points.[24]

In Column 1, per capita income and trade openness still play a significant role in the growth of the public sector. Similarly, the presence of democratic institutions continues to affect the size of government. The Gini index is positive and statistically significant. As income distribution widens, political demands for redistribution go up. For each point the Gini index increases, public revenues rise 0.4 percent of GDP—this translates into a difference of 19 percentage points of GDP between the minimum and the maximum values of the sample. The interactive term of the Gini index and democracy is slightly negative, and thus contrary to the model, but statistically not significant. The level of political participation boosts public revenue in line with previous results. The interactive term of turnout and the Gini index has a negative impact on the public sector and is statistically significant. The size of this coefficient implies that only at very high levels of income inequality (over a Gini index of 62) do higher levels of participation translate into a slight drop in government size—for the maximum value of the Gini index in the sample (66), it falls by less than 1 point when one goes from low to high levels of turnout. The waning effects of higher participation on government size at very high levels of income inequality can be attributed to the following fact. For very high levels of inequality, that is, in societies with a very skewed distribution of income in favor of the rich, any reasonable level of turnout will lead to have a median voter with a low income. Therefore, any increase in participation will not change significantly the already substantial distance between the median and average income. By contrast, for much more equally distributed income structures, participation will correspondingly increase the distance between the median voter income and average income and will therefore affect more strongly the size of the tax burden.

Column 2 in Table 3 includes controls for share of agriculture and old-age dependency ratio, alone and in interaction with democratic regime.[25] Although the sample drops to 425 observations, the model behaves in

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[21]Adding the proportion of fuel exports over total exports to control for the impact of substantial oil revenues does not change the coefficients in Table 2. As expected, oil exporters have a larger government—although the effect is small.

[22]The interactive term "Democratic Regime*Share of Agricultural Sector" is here positive. But a simulation of the results shows that, given the negative coefficient of "Democratic Regime" and the interactive term of "Turnout*Share of Agricultural Sector," authoritarian regimes have lower levels of public revenue than democracies for similar levels of industrialization.

[23]Notice that proportional representation turns out to increase public revenues very substantially. Still, the size of the sample (about a third of the one in Table 1) weakens this result.

[24]It is important to stress that the conclusions from Table 3 cannot be automatically extrapolated to the universe employed in Tables 1 and 2. Two traits of the sample are enough to bring forth this fact. In the data set of 1975 observations employed in Tables 1 and 2, 65 percent of the cases are authoritarian regimes and 52 percent have Gini indexes below 40. In the data set of 617 observations in Table 3, 85 percent are democratic and 59 percent have Gini indexes below 40.

[25]Their interactive terms with level of turnout have not included given the possibility of multicollinearity effects.

TABLE 3   The Size of Governments across the World. Testing the Impact of Income Distribution

Independent Variables	Public Revenue as Percent of GDP	
	(1)	(2)
Constant	−73.20***	0.82
	(11.80)	(11.08)
Per Capita Income (Log)	7.85***	
	(0.64)	
Share of Agricultural Sector		−0.57***
		(0.18)
Old-Age Dependency Ratio		0.21^^
		(0.23)
Trade Openness	3.91***	3.20***
	(0.68)	(0.83)
Democratic Regime	9.18^	17.99^
	(14.00)	(15.84)
Gini Index	0.40**	0.44**
	(0.22)	(0.20)
Democratic Regime* Gini Index	−0.21	−0.48
	(0.30)	(0.32)
Level of Turnout in Democracies	0.31***	0.28*
	(0.12)	(0.15)
Level of Turnout* Gini Index	−0.006**	−0.005*
	(0.003)	(0.003)
Share of Agricultural Sector* Democratic Regime		0.10^^
		(0.19)
Old-Age Dependency Ratio* Democratic Regime		0.08^^
		(0.25)
Model Chi-square	585.73	405.87
Prob>Chi-square	0.0000	0.0000
R^2	0.916	0.923
No. of observations	617	425

Estimation: Ordinary last squares estimation, with panel corrected standard errors, and correction for autocorrelation and for heteroskedastic disturbances between panels.

Standard errors in parenthesis.

* $p < 0.10$; **$p < 0.05$; ***$p < 0.01$

^In joint test of share of democratic institutions, Gini index and the interactive term, statistically significant (Prob>chi2 = 0.0000).

^^In joint test of share of agricultural sector or dependency, democratic institutions and the interactive term, statistically significant (Prob>chi2 = 0.0000).

line with previous results. The shift to both an industrialized economy and a more mature population as well as higher levels of inequality translate into a larger state. Similarly, democracy and strong participation rates lead to a bigger public budget. The impact of the demographic transition becomes particularly intense under democratic regimes. The creation of an industrial working class and the level of overall inequality, instead, do not seem to interact with political institutions to boost

the size of the public sector. Part of these latter results are not strange given that 85 percent of the observations in Column 2, Table 3 are democratic regimes. Given this highly homogeneous sample, the variable "Gini Index" is picking all the redistributive pressures associated with inequality.[26]

[26] The decline of the agricultural sector does interact with turnout, however, to boost the public sector, as shown in Table 2.

Concluding Remarks

The exploration of the forces that have shaped the economic role of the state across developed and developing nations shows that modernization plays a fundamental, yet not mechanical, role in determining the size of the public sector.

The process of economic modernization leads to larger public sectors in two different ways. On the one hand, the opportunities granted by a potentially growing economy spur public intervention. To cope with market failures that haunt the provision of key infrastructures and to set up a regulatory framework that boosts private investment, states may step in and increase tax collection. On the other hand, economic development leads to the generation of redistributive demands due to structural changes. In the first place, whereas risks are generally common to most individuals in agrarian societies, modern technological shocks lead to the differentiation of the population according to skills and risks, such as industrial accidents and joblessness, in particular segments of the population. With the decline of extended families, the traditional means of supporting workers in economic downturns, that is, informal help from relatives, disappear. Collective insurance schemes must then be developed to ease the impact of unemployment. In the second place, technological improvements, in the areas of food production and health care, increase life expectancy and lead to the emergence of health institutions and pension systems for the elder.

Economic development does not mechanically lead to larger public sectors. Taxes and expenditure are set through a political mechanism, whereby politicians match the preferences of the enfranchised. As a result, redistributive programs emerge conditional on the political regime in place. In authoritarian regimes, generally imposed to block redistribution, or in democracies with low levels of turnout, taxes remain low. Conversely, in democratic regimes, the public sector grows as modernization shifts the underlying distribution of interests toward the development of both intragenerational and, especially, intergenerational transfers.

Within democratic regimes, electoral turnout plays a powerful role in boosting the size of the public sector. As participation goes up, the underlying redistributive tensions effectively force politicians to expand public programs. By contrast, different constitutional arrangements, which had been claimed to be central in the most recent comparative literature, have a marginal effect on the size of the state. Presidential systems generally depress the level of government revenues. But both federal

arrangements and electoral systems have little impact on the state. In short, the structure of societal interests and electoral preferences always emerge as the key factor to study to understand the role of the public sector across nations.

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APPENDIX A.
Baumol's Cost Disease and the Growth of the Public Sector

Following Baumol's cost disease model, it has been argued that given that the public sector is engaged in activities that experience lower productivity growth than nonpublic (manufacturing) sectors, and given that the demand for public services is (politically) fixed, over time the public sector will use more labor inputs and will, implicitly, consume a growing part of the economy's resources. Although the first conclusion may be true (and public employment may grow), the second result does not follow, however, from the model.

Set-up. Applying Baumol (1967) to the analysis of the growth of the public sector, consider an economy with two sectors, private (P) and public (G). The private sector pays for G through a tax τ.

Productivities differ in both sectors. In the public sector, the productivity of labor is constant, and output at time t is $Y_{Gt} = aL_{Gt}$, where L_{Gt} is the quantity of labor employed at time t and a is a constant. By contrast, in the private sector the productivity of labor grows at a constant compounded rate r, so that at time t, output is $Y_{Pt} = bL_{Pt} e^{rt}$, where b is a constant.

Wages are equal in the two sectors at W_t, and W_t grows in accord with the productivity of the private sector, so that $W_t = We^{rt}$, with W equal to some constant.

Divergent Costs. As a result of productivity differentials, the costs in each sector diverge. Total costs for the private and the public sector are, respectively:

$$C_P = W_t L_{Pt} = We^{rt} L_{Pt}$$
$$C_G = W_t L_G = We^{rt} L_{Gt}$$

Their respective unit costs are:

$$c_P = (We^{rt} L_{Pt} / Y_{Pt}) = (We^{rt} L_{Pt} / bL_{Pt} e^{rt}) = W/b$$
$$c_G = (We^{rt} L_{Gt} / Y_{Gt}) = (We^{rt} L_{Gt} / aL_{Gt}) = We^{rt} / a$$

So, whereas P's unit costs remain constant, G's unit cost grow at the compounded rate r.

G as a Share of the Economy. If the demand for G's output is inelastic, then $Y_G = \hat{Y}_G$. Assume that the portion that P will spend (through τ) to satisfy this demand will be given by the cost of the production of G divided by the cost of the production of P (the total cost of Y_P will be equal to the total value in a competitive market):

$$\tau = \frac{\hat{Y}_G c_G}{Y_P c_P}$$

Substituting the terms and solving this expression, it is possible to show that the proportion of G as an effort of P does not change for a fixed demand of public services and wage increases equal to the productivity increases of the private sector:

$$\tau = \frac{aL_G(We^{rt}/a)}{bL_{Pt}e^{rt}(W/b)} = \frac{L_{Gt}}{L_{Pt}}$$

In short, although labor costs increase in the public sector, the share of G as a proportion of the available resources does not increase.

APPENDIX B
Sample

Algeria (1970–79), Benin (1965–67), Botswana (1967–68, 1973–87), Cameroon (1974–87), Congo (1980–88), Djibouti (1979–80), Gabon (1974–78), Ghana (1955–59), Guinea–Bissau (1986–87), Ivory Coast (1970–79), Lesotho (1972–83), Malawi (1973–82), Mali (1981–82), Mauritius (1950–63, 1969–90), Morocco (1951–54), Niger (1975–77), Nigeria (1952–60, 1963–68), Sierra Leone (1963–64, 1985–90), South Africa (1950–90), Sudan (1970–71, 1980–83), Swaziland (1967–72, 1980–88), Togo (1963–64, 1970–72), Tunisia (1965–90), Zaire (1950–59), Zambia (1955–63, 1967–73), Zimbabwe (1954–59, 1965–89), Barbados (1960–63), Canada (1950–89), Costa Rica (1950–60, 1965–90), Dominican Republic (1968–69), Guatemala (1955–63), Honduras (1950–85), Jamaica (1953–89), Nicaragua (1965–78), Panama (1952–70, 1973–90), Trinidad and Tobago (1951–62, 1975–90), United States (1950–90), Argentina (1973–80), Bolivia (1958–63, 1965–69, 1980–86, 1988–90), Brazil (1973–74, 1980–89), Chile (1950–76), Colombia (1951–63, 1965–71, 1973–90), Ecuador (1950–63, 1970–78, 1980–90), Guyana (1955–56, 1960–63), Paraguay (1970–90), Peru (1951–58, 1965–90), Suriname (1972–75), Uruguay (1955–63, 1980–90), Venezuela (1960–65, 1970–75, 1978–90), India (1950–57, 1960–90), Iran (1973–90), Israel (1953–54, 1960–90), Japan (1950–90), Jordan (1959–63, 1983–86), Korea (1953–90), Malaysia (1960–67, 1969–73), Myanmar (1950–63), Philippines (1951–90), Singapore (1960–69), Sri Lanka (1970–90), Taiwan (1951–63), Thailand (1965–90), Yemen (1972–73), Austria (1950–90), Belgium (1950–88), Denmark (1950–58, 1960–90), Finland (1954–89), France (1950–90), West Germany (1950–56, 1960–90), Greece (1950–88), Iceland (1965–68, 1970–90), Ireland (1950–90), Italy (1955–90), Luxembourg (1952–86), Malta (1954–60, 1965–89), Netherlands (1950–90), Norway (1951–90), Portugal (1952–89), Spain (1954–90), Sweden (1950–89), Switzerland (1955–90), Turkey (1965–72), United Kingdom (1950–90), Australia (1950–60, 1965–90), Fiji (1977–89), New Zealand (1950–65), Papua New Guinea (1965–72), Solomon Islands (1984–86), Vanuatu (1983–89).

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