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Exploring Cross-Country Variation in Government Shares: What Can We Learn from Relative Productivities?*

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Abstract

Government shares in total output are characterized by significant variation across countries. As a starting point of my study, I notice strong negative correlation between government consumption share and price of government services in terms of private consumption. Motivated by this empirical observation, I develop a neoclassical growth model with added government that is capable of matching the variation in government shares very closely using only relative prices. In addition, I provide empirical evidence showing that the relative price of government consumption increases in income which is consistent with distortions prevailing in poor countries. These two observations combined imply that government shares tend to be higher in poorer countries.

JEL classification numbers: H50, H40, E13

Keywords: Government consumption; Relative government shares; Relative international prices; Neoclassical growth model; the Penn World Table

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1 Introduction

Government shares in total output are characterized by significant variation across countries. For example, in 1996 the difference between the top 5% and the bottom 5% of shares from the Penn World Table (PWT) is almost 40 percentage points.[1] This difference is striking, given the mean value of 0.23. In this paper I offer one possible scenario that can explain cross-country variation in government size. First of all, I notice that there is strong negative correlation between relative government shares and relative prices of government to private consumption using internationally comparable prices. Motivated by this empirical observation, I develop a neoclassical growth model with added government that is capable of matching the variation in government shares very closely using only relative prices. Finally, I discuss the macroeconomic implications of this result.

As a starting point of my study I observe that government consumption shares decline with the relative price of government consumption in terms of private consumption when measured at international prices from PWT. It suggests that relative prices may play an important role in explaining the significant variability in output composition across countries.

On the next stage, I develop a neoclassical growth model with added government implying that government shares decline in the price of government consumption relative to private consumption.[2] Calibrating the model to the US economy and allowing only the relative price to change across countries generates government shares that are very close to those from the PWT data. This is the main result in the paper in the sense that the observed government shares in PWT are very close to the first-best socially optimal solution implied by the model. It is somewhat remarkable how much of the variation in government shares can be explained by a simple model which allows only relative government prices to vary across countries.

Finally, I discuss possible macroeconomic implications of this result. In particular, I report additional evidence showing that relative price of government consumption is higher in richer countries. The relative price of government consumption in the model equilibrium is equal to the inverse ratio of Total Factor Productivities in government and private sectors.[3] These two observations imply that poorer countries are *relatively* more efficient at producing government than private goods. I argue that distortions that prevail in poorer countries in the form of explicit and implicit taxation make private sector relatively inefficient. When this observation is combined with the result from my model, it implies that government shares tend to be higher in poorer countries.

This paper contributes to the existing literature in the following ways. To begin with, this is the first paper of which I am aware that identifies strong dependence of government size on relative productivity and also develops a model consistent with this dependence. Second, the paper uses internationally comparable data from PWT that allows direct cross country comparisons. Summers and Heston (1991) aggregation methodology for price comparisons may be preferable to using nominal exchange rates that tend to deviate from purchasing power parities (PPPs) in systematic ways. Moreover, the Penn World Table seems to have observations on more countries over longer time spans with less missing data compared to other data sets. Third, the explanation for government size variations put forward in this paper is based on rigorous economic modeling. Previous empirical work aimed at explaining differences in government size often does so in the absence of a well-developed theory on how the available covariates determine government size. Finally, few papers have studied the importance of relative prices in explaining variability in government shares across countries.[4]

This paper also has some limitations. First, the PWT definition of government is limited only to government consumption (*i.e.* goods consumed collectively), so this is the notion

I employ in this paper. Private consumption expenditure, on the other hand, includes all private goods (*i.e.* goods that can in principle be sold to individuals and consumed by them without any external benefit to others).[5] The detailed data on total government size over such an extensive number of countries and years as in PWT do not seem to be available from other sources. This may be a serious obstacle for extending the results to total government size. The second limitation is that political considerations may play an important role in determining the total government size in addition to TFPs. There is an extensive literature on the subject - Meltzer and Richard (1981) is a prominent example - which ascertains the role of welfare transfers.[6] This paper shows that differences in TFPs can explain almost all of the variation in government consumption around the world. However, in order to model total government size, one might best consider a unified approach which also incorporates political process and its role in determining welfare transfers.

Notwithstanding these limitations the current paper may be a significant step forward in our understanding of government consumption across countries and its relation to TFP differences.

This paper is organized as follows. In the next section I show that there is strong negative correlation between relative price of government consumption and relative government shares. In Section 3 I develop a two-sector neoclassical growth model and derive a negative relationship between relative government shares and relative prices as part of the model equilibrium. I calibrate the model in Section 4. Results and robustness checks are dealt with in Section 5. Section 6 discusses macroeconomic implications of the model and the last Section concludes.

2 Relative prices and government shares

In this section I report the empirical relationship between relative prices and government shares which motivates my theoretical model in section 3. To construct relative prices I use series *Price Level of Consumption (PC)* and *Price Level of Government (PG)* from PWT 6.2 over the period 1970-2003. I define $RPRICE$ as the relative price of government in terms of consumption and normalize it by the corresponding ratio for the US.[7] I also normalize *Real gross domestic product per capita (CGDP)* for country j by the corresponding variables for the US and apply log transformation to all series.

I report average correlations for 1970-2003, results for a benchmark year 1996 and the most recent year in the data, 2003.[8] The graphs are provided for the most recent year with benchmark data (1996) but time series graphs over the entire time period demonstrate similar patterns and are available upon request. Table 1 and Figure 1 imply the following empirical result:

Empirical Result. *There is a negative correlation between the relative price of government consumption and government share if measured at international prices.*

[TABLE 1 AND FIGURE 1 ABOUT HERE]

The correlation of relative government shares with $RPRICE$ is -0.558. This empirical observation is the focus of the current paper and a two-sector neoclassical growth model in Section 3 is developed to account for this correlation.

3 Model

I use a neoclassical growth model with added government. There are two sectors that produce private consumption and investment goods (C and I) denoted by Y and government

consumption goods denoted by G. The production technology in country j in period t is constant returns to scale Cobb-Douglas with equal capital shares:

$$Y_t^j = C_t^j + pI_t^j = A_{Yt}^j (K_{Yt}^j)^\alpha (L_{Yt}^j)^{1-\alpha}, \quad (1)$$

$$G_t^j = A_{Gt}^j (K_{Gt}^j)^\alpha (L_{Gt}^j)^{1-\alpha}, \quad (2)$$

where p is the constant cost of transforming one unit of consumption into investment which is the same in all countries.[9] It might be thought of as an exogenous linear technology that converts C_t^j into I_t^j or as barriers to investment in the spirit of Restuccia and Urrutia (2001). Total Factor Productivity (TFP) terms A_Y^j and A_G^j grow in all countries j exogenously at a constant rate $(1 + g_A)$.

Perfectly competitive firms maximize profits at current prices P_{Ct}^j and P_{Gt}^j:

$$\pi_{Yt}^j = P_{Ct}^j Y_t^j - w_t^j L_{Yt}^j - R_t^j K_{Yt}^j, \quad (3)$$

$$\pi_{Gt}^j = P_{Gt}^j G_t^j - w_t^j L_{Gt}^j - R_t^j K_{Gt}^j, \quad (4)$$

where w_t^j is wage in period t.[10] The nominal interest rate satisfies $R_t^j = rP_{It}^j$, where r is real rate of return on capital and P_{It}^j is price of investment goods in period t. Equal capital shares immediately yield the same capital-labor ratios equal to the economy-wide K_t^j/L_t^j. Firms' profit maximization yields two equations:

$$R_t^j = \alpha P_{Ct}^j A_{Yt}^j \Big(\frac{K_t^j}{L_t^j}\Big)^{\alpha-1} \text{and} \quad (5)$$

$$\frac{P_{Gt}^j}{P_{Ct}^j} = \frac{A_{Yt}^j}{A_{Gt}^j}. \quad (6)$$

No arbitrage condition in equilibrium implies that $p = PI_t^j/PC_t^j$.

Each representative agent supplies unit of labor inelastically and chooses private and public

consumption, given the weight attached to private consumption η, to maximize

$$\sum_{t=0}^{\infty} \beta^t \Big[\eta \log C_t^j \quad + \quad (1-\eta) \log G_t^j \Big] \tag{7}$$

subject to

$$K_{t+1}^j = (1-\delta) K_t^j + I_t^j, \tag{8}$$

$$P_{Ct}^j (C_t^j + p I_t^j) + P_{Gt}^j G_t^j = w_t^j + R_t^j K_t^j. \tag{9}$$

Notice that private and government consumption goods enter separately in the utility function and that parameters β, η and δ are the same in all countries. The resource constraints satisfy $L_t^j = L_{Yt}^j + L_{Gt}^j$ and $K_t^j = K_{Yt}^j + K_{Gt}^j$.

It can be shown that along the balanced growth path (on which I will concentrate) C, I, G and K all grow at the same rate $(1+g) = (1+g_A)^{\frac{1}{1-\alpha}}$. The first order conditions yield constant real rate of return on capital in all countries j

$$r = \frac{(1+g)}{\beta} - 1 + \delta. \tag{10}$$

The economy wide capital-labor ratio in country j is then equal to

$$\Big(\frac{K_t^j}{L_t^j} \Big)^{\alpha - 1} = \Big(\frac{p}{\alpha A_{Yt}^j} \Big) \Big[\frac{(1+g)}{\beta} - 1 + \delta \Big]. \tag{11}$$

Define the following government share of country j in the US prices

$$s_t^j = \frac{P_{Gt}^{us} G_t^j}{P_{Gt}^{us} G_t^j + P_{Ct}^{us} Y_t^j}, \tag{12}$$

where P_{Gt}^{us} and P_{Ct}^{us} are the nominal prices in the USA. The firms' profit maximizing conditions (suppressing country index j) imply

$$\frac{P_{Ct} Y_t}{P_{Gt} G_t} = \frac{A_{Gt}}{A_{Yt}} \frac{A_{Yt} (K_t / L_t)^{\alpha} L_{Yt}}{A_G (K/L)^{\alpha} L_{Gt}} = \frac{L_{Yt}}{L_{Gt}} = \frac{L_t - L_{Gt}}{L_{Gt}}. \tag{13}$$

Government shares measured at a common set of US prices depend on relative productivities:

$$s_t^j = \left[1 + \frac{P_{Ct}^{us} Y_t^j}{P_{Gt}^{us} G_t^j} \right]^{-1} = \left[1 + \frac{P_{Ct}^{us} L_{Yt}^j}{P_{Gt}^{us} L_{Gt}^j} \frac{A_{Yt}^j}{A_{Gt}^j} \right]^{-1} = \Big[1 + \frac{(P_{Gt}^j / P_{Ct}^j)}{(P_{Gt}^{us} / P_{Ct}^{us})} \frac{L_{Yt}^j}{L_{Gt}^j} \Big]^{-1}, \tag{14}$$

which explains why I chose US nominal prices for the common set of prices. From the above expression countries with higher relative productivity in private sector Y_t^j will tend to have lower government shares if measured at common prices.

In the spirit of Restuccia and Urrutia (2001), for consistent cross-country comparisons I need a measure of relative prices which is not subject to spurious correlations (*e.g.*, due to measurement error in international prices). To achieve this goal I approximate the ratio of domestic prices in national currency $\frac{(P_{Gt}^j/P_{Ct}^j)}{(P_{Gt}^{us}/P_{Ct}^{us})}$ by the corresponding ratio of internationally comparable prices available from PWT:

$$\frac{(P_{Gt}^j/P_{Ct}^j)}{(P_{Gt}^{us}/P_{Ct}^{us})} = \frac{(PG_t^j/PC_t^j)}{(PG_t^{us}/PC_t^{us})}. \tag{15}$$

This also provides the connection between the model and my empirical investigation above.[11] Finally, setting total demand in the economy (obtained from the first order conditions) to the total production allows me to solve for the labor share in government production

$$\frac{L_{Gt}^j}{L_t^j} = (1-\eta)\Big[1 - \frac{(g+\delta)\alpha}{r}\Big]. \tag{16}$$

Since $L_{Yt}^j = L_t^j - L_{Gt}^j$ the ratio $\frac{L_{Yt}^j}{L_{Gt}^j}$ used in equation (14) is equal to

$$\frac{L_{Yt}^j}{L_{Gt}^j} = \frac{\eta + (1-\eta)\chi}{(1-\eta)[1-\chi]}, \tag{17}$$

where $\chi = \frac{(g+\delta)\alpha}{r}$.

Equation (14) is the key equation at which my further analysis is centered. Before calibrating the economy and performing the quantitative experiments, it is useful to discuss the logic behind the model equation. The ratio $\frac{L_{Yt}^j}{L_{Gt}^j}$ is constant across countries j because it depends only on the parameters of the model that are the same for all countries. The discipline imposed by the model comes from the parameters that are calibrated to be consistent with the notion of data in the Penn World Table. The only part of the model equation (14) that

brings the variability in government shares is the relative price P^j_{Gt}/P^j_{Ct}. The model implies that government shares decline non-linearly in the relative price of government in terms of consumption P^j_{Gt}/P^j_{Ct}.

4 Calibration

To evaluate the empirical success of the model, I need to calibrate parameters for technology (α, g and δ) as well as for preferences (β and η) that are consistent with data definitions in PWT. I calibrate parameters to the United States because high quality data for calibration are readily available for the entire period of 1970-2003 used in my study.

To calibrate technological parameters I broadly follow the procedure in Cooley and Prescott (1995). First of all, after constructing the series of service flows from private capital I find that the average interest rate for 1970-2003 is equal to 7.1%. The real average long-term growth rate g is set to 1.9% using the series of the real per capita GNP. The law of motion for the capital stock implies the average depreciation rate of government capital equal to 3.3%. I use this depreciation rate to construct the service flows from the government capital. Together with the service flows from private capital and GNP this implies the average capital share of 0.30. The notion of capital in the calibration exercise should be consistent with the notion of capital in PWT. Thus, it is not surprising that the value of α is lower than the value of 0.40 in Cooley and Prescott (1995), because PWT does not include consumer durables and land in the series for investment. The overall depreciation rate for the economy then equals 4.5% implying $\beta = 0.993$.[12] The resulting capital output ratio is 3.09.

Finally, I calibrate the parameter η so that equation (14) holds with equality for the US. In other words, η is chosen to predict US government share exactly. The calibrated value is reasonable: $\eta = 0.84$ is the weight attached to private consumption. The results of the

calibration exercise are presented in Table 2 and further details are available from the author.

[TABLE 2 AND FIGURE 2 ABOUT HERE]

Figure 2 illustrates the results of the calibration exercise: the solid curve depicts government shares generated by the model as a function of relative price P^j_{Gt}/P^j_{Ct}. The model equation, calibrated as above, seems to capture a significant portion of the variability in the data, which is also confirmed by my further quantitative analysis.

5 The quantitative experiment

In this section I perform the following quantitative experiment for the most recent year with benchmark data (1996) in PWT: given the parameters calibrated to the US economy, I assess how much of the variation in government shares the model can reproduce (from equation 14) if only relative government prices change.

The model generates the highest correlation of 0.484 for the countries above the median income. The model slightly underpredicts the coefficient of variation in the range from 0.865 (for the poorer subsample) to 0.944 (for the entire sample). Government shares from the model generate a Gini coefficient very close to that observed in the data (0.215 versus 0.228). In general, the model explains a significant portion of the cross-country variation in government shares (Table 3). Figure 3 shows government shares from the model versus those from the data for the entire sample.

[TABLE 3 AND FIGURE 3 ABOUT HERE]

A few robustness checks may be useful. The reader might worry if the results are driven by some tiny countries like St. Vincent and Grenadines with population of $112,509$ and the highest PWT government share of 57.13%. They are not. Table 4 reports the results for all countries with population above 1 million.

[TABLE 4 ABOUT HERE]

In the calibration exercise I attempted to ensure that the conceptual framework of the model economy is consistent with the PWT data. However, the reader may be interested to learn how the results are affected by marginal changes in the calibrated parameters. For this purpose I increase and decrease each of the parameters r, g, δ and α by 10% and re-calculate η such that it still perfectly matches the US share. The results for the first 4 parameters in the entire sample are only marginally affected and are available upon request.

On the other hand, changing η has a stronger effect on model performance, as reported in Table 5. Calibrating η to match US government share conveys a lot of information about other countries and tends to explain a significant portion of the variability in government shares. The model is less successful in matching the two key statistics, the coefficient of variation and the Gini coefficient, if η is increased or decreased by only 10%. Thus, the model suggests that the data are characterized by similarity in the preferences for government consumption to the case of the US.

[TABLE 5 ABOUT HERE]

6 Discussion

The model developed above is capable of explaining most of the variation in government consumption around the world based solely on the relative price of government to private consumption. What are the macroeconomic implications of this simple neoclassical setup? Consider Figure 4 and Table 6 showing that the relative price of government consumption increases with relative per capita income. This means that poor countries are *relatively* more efficient at producing government goods than rich ones.

[FIGURE 4 AND TABLE 6 ABOUT HERE]

As a result, when evaluated at international prices, government shares are higher in poorer countries and Figure 5 and Table 7 show some evidence in support of this claim.

[FIGURE 5 AND TABLE 7 ABOUT HERE]

The question that follows naturally is: why poorer countries are *relatively* better suited to produce government goods than their richer counterparts? This empirical observation is consistent with the existence of distortions against private sector that prevail in poor countries. These distortions can take the form of official taxes and regulations (such as trade quotas) or implicit taxation. In the related literature, Easterly and Rebelo (1993) show that differences in trade barriers and tax rates are relatively small to explain huge variation in income and capital accumulation across countries. On the other hand, implicit restrictions in the form of bureaucratic regulations, corruption, bribes, prohibitions and so on may be much more important. Rectuccia and Urrutia (2001) provide some examples of those restrictions in Latin American countries.

In any case, both types of taxation would bring about the differences in relative productivities in government and private sectors this paper relies on to explain cross-country variation in government consumption. Indeed, restrictions on private sector in poor countries would make private good relatively more expensive shifting output in the direction of higher government consumption. This would be consistent with the theoretical model and strong empirical dependence of government size on relative prices presented in this paper.

7 Conclusions

The purpose of this paper was to explain significant cross-country variation in relative government shares. I attempted to achieve this goal in the following three steps. First of all, I noticed strong negative correlation between relative prices and government shares. Mo-

tivated by this empirical observation, I developed a neoclassical growth model with added government that was capable of matching government shares in the data very closely using only relative prices. Finally, I argued that distortions against private sector that prevail in poor countries make private consumption relatively more expensive. As a result, poorer countries tend to have higher government consumption share.

It is important to bear in mind that the definition of government in PWT includes only collective consumption and not total government expenditure, which encompasses transfers and private goods purchased by the government. As such, the analysis I presented here explains only variations in government consumption and not total government share in the economy. Data availability over such a wide array of countries and over a significant time period may be a major obstacle in extending the results to total government size.

However, this last observation might be an interesting topic for future theoretical research: it would be useful to develop a model that can explain total government size as the sum of government consumption and government transfers. From this work and from the political economy literature, it is clear that such a model should unify the two approaches, including factor productivities as well as the political process.

While incorporating the political process into the model may be necessary to explain the differences in the total government size, this work is a considerable step toward a better understanding of government consumption around the world and its connection to economic development. A simple economic story with prices driving the choice of optimal government size may explain a significant portion of cross-country differences in the size of government consumption.

Footnotes

1. This is the most recent year when the Penn World Table has benchmark price data for a large number of countries. By the top (bottom) 5 % I mean the average share of 5% of countries with the highest (lowest) government shares in PWT.

2. The model choice is motivated by the studies of investment rates in Restuccia and Urrutia (2001) and Hsieh and Klenow (2007).

3. This is a familiar result in the literature with Restuccia and Urrutia (2001) being one example.

4. Khan (1988) is one example.

5. For details please refer to Kravis, Heston and Summers (1982, 33-34).

6. The interested reader is referred to surveys such as Mueller (2001, chapter 21).

7. That is, for country j relative price is: $RPRICE = (\frac{PG_t^j}{PC_t^j})/(\frac{PG_t^{us}}{PC_t^{us}})$. Following Restuccia and Urrutia (2001) I normalize the price ratio $\frac{PG_t^j}{PC_t^j}$ by the US price ratio to avoid measurement error in international prices.

8. Average ^{150} is based on a balanced sample of 150 countries that have data in every year for 1970-2003. Average ^{All} takes *all* available observations for any year so that the number of countries differs over years. The two averages usually lie within a few percentage points of each other.

9. Government goods are produced by competitive firms that participate in government tenders and compete for contracts.

10. Note that I express the price of private good Y in terms of consumption.

11. In my empirical analysis above I use the ratio cg_i/cg_{us} instead of cg_i. This will have the effect of centering the graphs with the US having share of 1 but, clearly, dividing all shares by a constant US share will not affect the correlations!

12. I do not include the population growth in my model economy because countries in the sample are not necessarily characterized by the steady state population growth. The depre-

ciation rate implicitly accounts for this fact because I use the growth rate g from the real *per capita* GNP. The "effective" time preference parameter would be clearly lower if accounted for the population growth.

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Tables

Table 1. Correlations between $RPRICE$ and government shares (in logs)

	All data (+/- 3 sd)	Above (+/- 3 sd)	Below (+/- 3 sd)
Average ^{150}	-0.558 (-0.571)	-0.590 (-0.596)	-0.515 (-0.502)
Average ^{ALL}	-0.534 (-0.554)	-0.569 (-0.590)	-0.493 (-0.492)
Year 1996	-0.527 (-0.504)	-0.576 (-0.561)	-0.445 (-0.373)
Year 2003	-0.562 (-0.608)	-0.580 (-0.675)	-0.547 (-0.546)

Note: All data are in current prices. First column - all data, second and third - above and below median income subsamples, respectively. Correlations without outliers (not within 3 standard deviations) are in parentheses. Average ^{150} is for a balanced sample of 150 countries that have all the data points for the period 1970-2003. Average ^{ALL} stands for all available observations in each year so that the number of countries differs over years.

Table 2. Calibrated values for the model economy

Parameter	Value
g	0.019
δ	0.045
α	0.30
β	0.993
η	0.84

Table 3. Government shares from the model and the data in 1996

All countries	Mean	St. Dev.	CV	Min 5%	Max 5%	Gini
Data	0.231	0.095	0.413	0.075	0.470	0.228
Model	0.200	0.078	0.390	0.085	0.390	0.215
Ratio	0.866	0.817	0.944	1.128	0.831	0.943
Correlation	*0.425*					
Above median	Mean	St. Dev.	CV	Min 10%	Max 10%	Gini
Data	0.208	0.079	0.381	0.095	0.367	0.208
Model	0.165	0.057	0.346	0.087	0.288	0.184
Ratio	0.794	0.719	0.906	0.917	0.786	0.885
Correlation	*0.484*					
Below median	Mean	St. Dev.	CV	Min 10%	Max 10%	Gini
Data	0.253	0.103	0.409	0.095	0.455	0.229
Model	0.232	0.082	0.353	0.120	0.396	0.197
Ratio	0.918	0.794	0.865	1.259	0.872	0.863
Correlation	*0.361*					

Note: In all cases, outliers (not within 3 standard deviations) are excluded. CV stands for the coefficient of variation. Min (Max) 5% and 10% are averaged over the corresponding percentage of countries. US excluded as a numeraire. Inclusion of US does not change results significantly.

Table 4. Government shares for countries with population above 1 million

All countries	Mean	St. Dev.	CV	Min 5%	Max 5%	Gini
Data	0.221	0.091	0.414	0.067	0.462	0.226
Model	0.206	0.082	0.400	0.090	0.412	0.219
Ratio	0.934	0.901	0.965	1.335	0.892	0.971
Correlation	*0.464*					

Note: In all cases outliers (not within 3 standard deviations) are excluded. US excluded as a numeraire. Inclusion of US does not change results significantly.

Table 5. The effect of η on model performance

η=0.757	Mean	St. Dev.	CV	Min 5%	Max 5%	Gini
Model	0.288	0.100	0.346	0.132	0.524	0.192
Ratio to Data	1.242	1.029	0.829	1.756	1.097	0.837
Correlation	*0.460*					
η = 0.925	Mean	St. Dev.	CV	Min 5%	Max 5%	Gini
Model	0.101	0.046	0.452	0.039	0.220	0.244
Ratio to Data	0.438	0.479	1.093	0.521	0.468	1.070
Correlation	*0.411*					

Note: US excluded as a numeraire. Inclusion of the US does not change results significantly.

Table 6. Correlations between $RPRICE$ and real GDP per capita (in logs)

	All data (+/- 3 sd)	Above (+/- 3 sd)	Below (+/- 3 sd)
Average ^{150}	0.345 (0.375)	0.429 (0.432)	0.130 (0.139)
Average ^{ALL}	0.338 (0.375)	0.421 (0.452)	0.128 (0.144)
Year 1996	0.481 (0.481)	0.508 (0.508)	0.158 (0.175)
Year 2003	0.457 (0.475)	0.312 (0.463)	0.226 (0.226)

Note: All data are in current prices. First column - all data, second and third - above and below median income subsamples, respectively. Correlations without outliers (not within 3 standard deviations) are in parentheses. Average ^{150} is for a balanced sample of 150 countries that have all the data points for the period 1970-2003. Average ^{ALL} stands for all available observations in each year so that the number of countries differs over years.

Table 7. Correlations between government shares and real GDP per capita for 1970-2003 (in logs)

	All data (+/- 3 sd)	Above (+/- 3 sd)	Below (+/- 3 sd)
Average ^{150}	-0.209 (-0.227)	-0.309 (-0.304)	0.037 (0.055)
Average ^{ALL}	-0.193 (-0.209)	-0.338 (-0.327)	0.053 (0.070)
Year 1996	-0.205 (-0.237)	-0.380 (-0.354)	0.101 (0.096)
Year 2003	-0.204 (-0.288)	-0.369 (-0.369)	-0.052 (-0.150)

Note: All data are in current prices. First column - all data, second and third - above and below median income subsamples, respectively. Correlations without outliers (not within 3 standard deviations) are in parentheses. Average ^{150} is for a balanced sample of 150 countries that have all the data points for the period 1970-2003. Average ^{ALL} stands for all available observations in each year so that the number of countries differs over years.

Figures

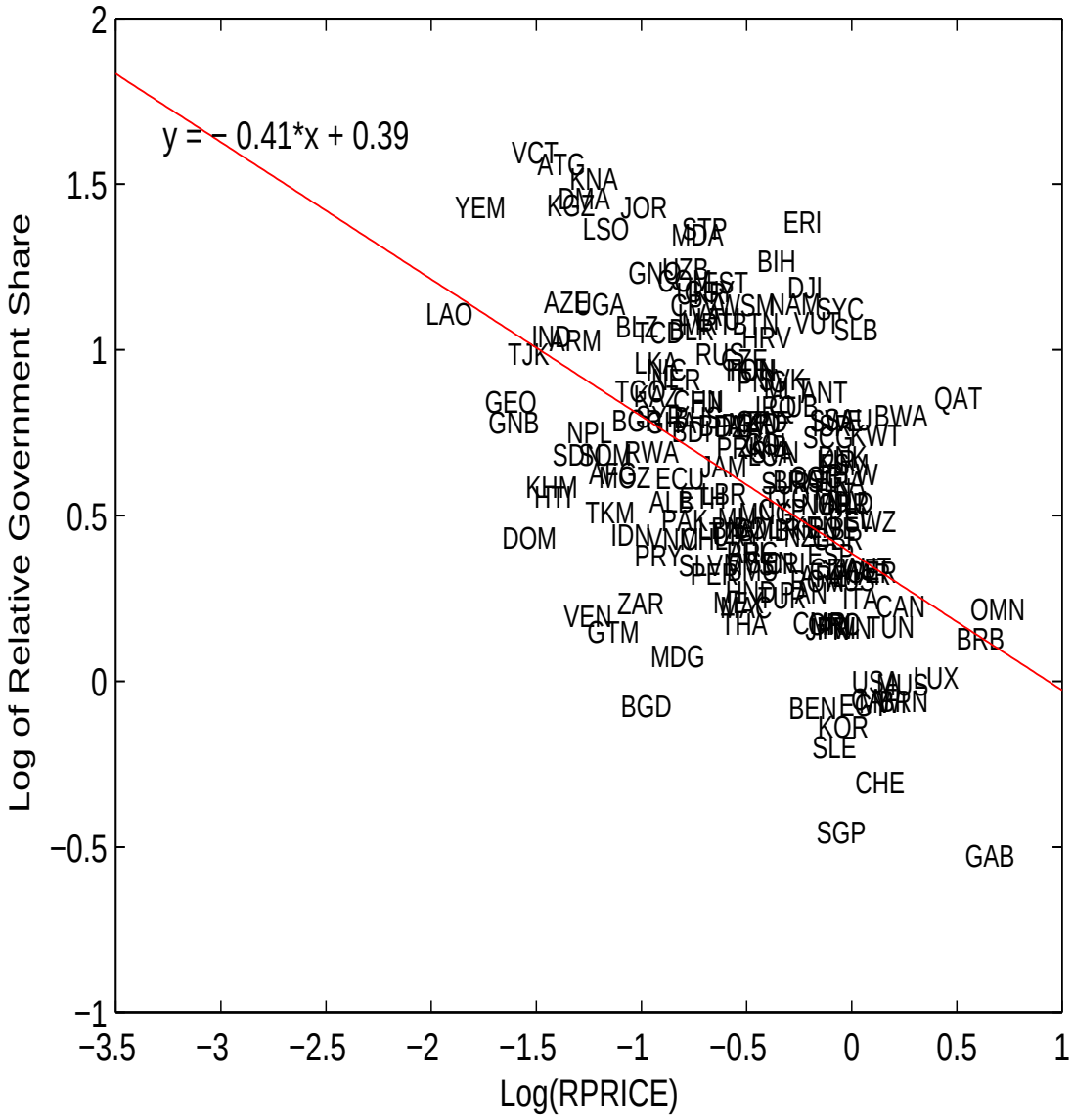

Figure 1: Log of Relative prices and government shares in 1996 (Correlation: -0.504).

Note: Equation and line are based on linear regression.

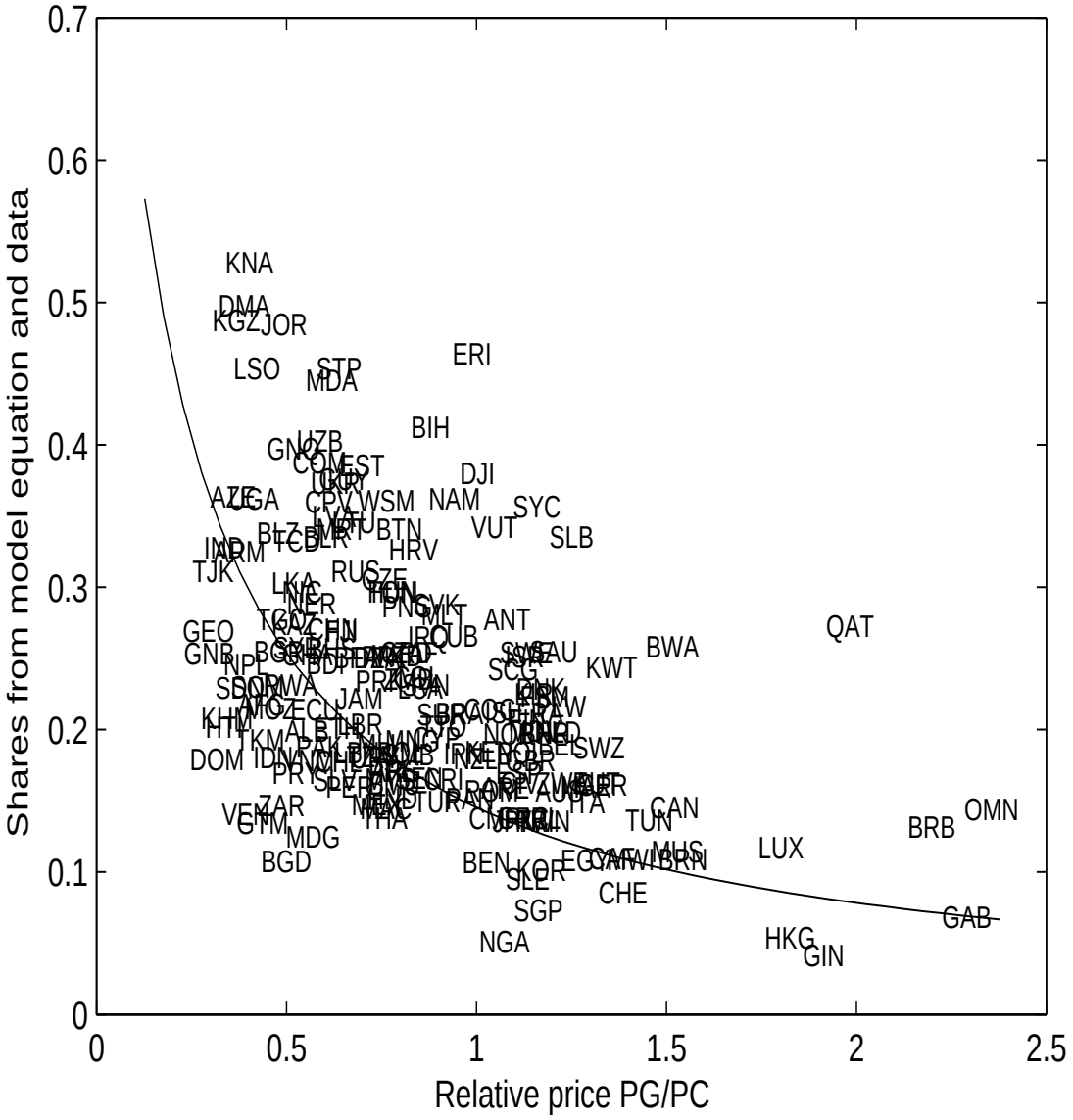

Figure 2: Model equation vs the data.

Note: Each point depicted as a three letter code stands for the corresponding government share in the data. Curve shows government shares predicted by the model given the calibrated values.

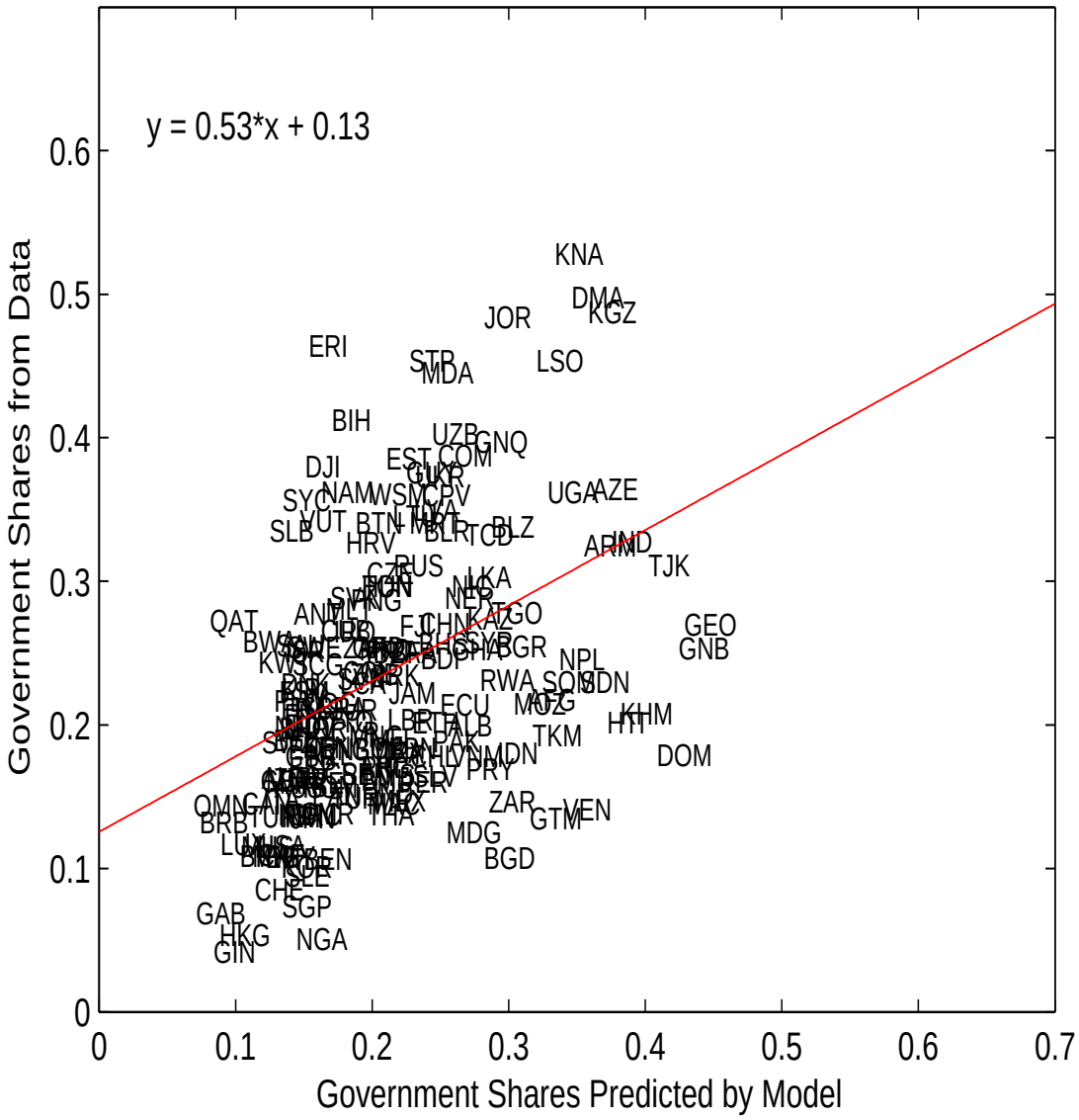

Figure 3: Government shares from the model and the data in 1996.

Note: Equation and line are based on linear regression.

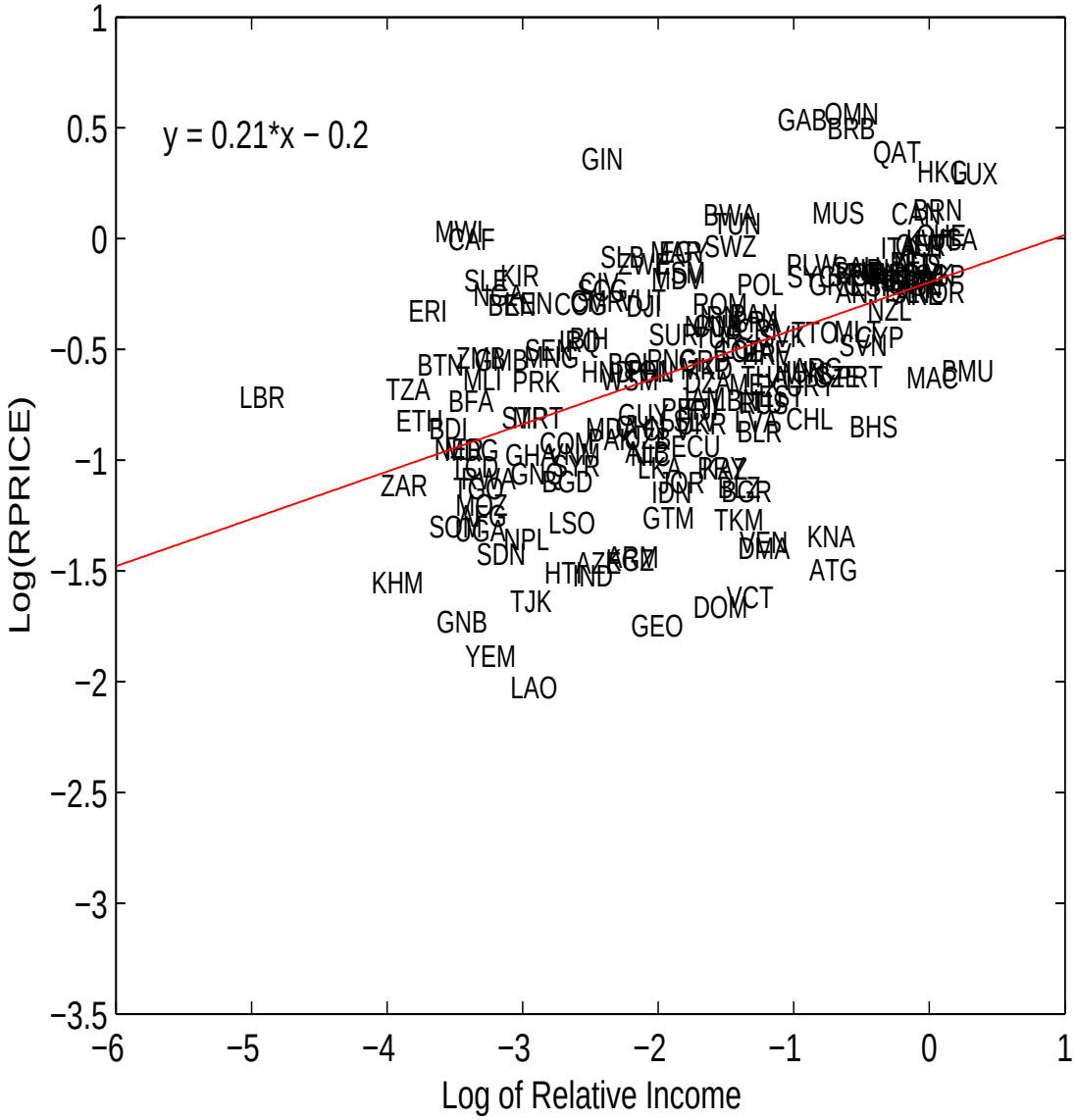

Figure 4: Log of Relative prices and relative income in 1996 (Correlation: 0.481).

Note: Equation and line are based on linear regression.

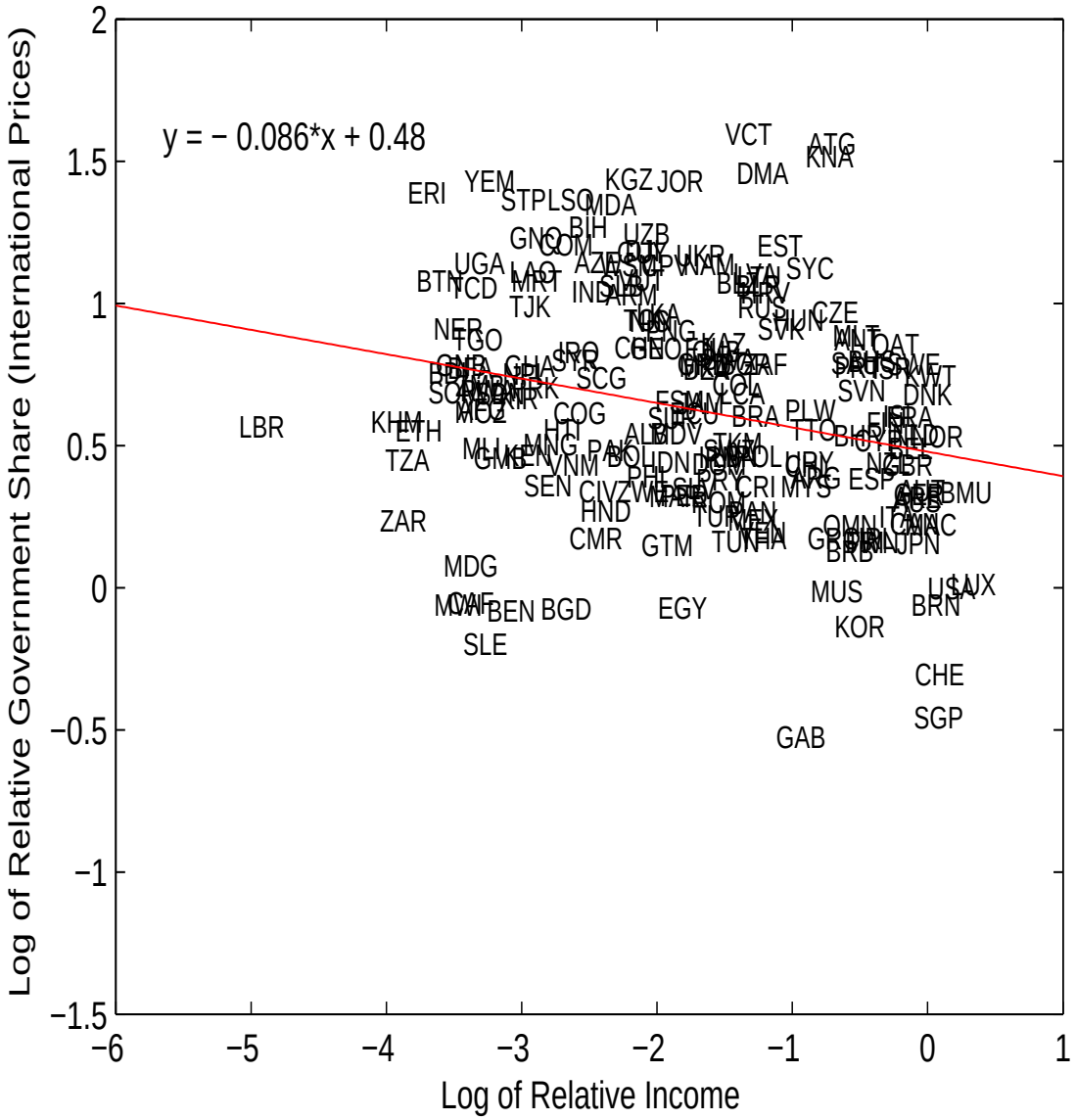

Figure 5: Relative government shares and relative income in 1996 (Correlation: -0.237).

Note: Equation and line are based on linear regression.