# Populist Budgets and Long Run Growth

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Abstract

Latin American economic policy in the 20th century was often dominated by populist administrations. Populist governments typically advocate large government expenditures and large government debt. While most studies have concentrated on the short-run effects of these policies, this paper analyzes the long-run growth implications. Specifically, we analyze the growth effects of sizeable budget deficits, large government expenditures, and an allocation of expenditures skewed towards transfers. We use a version of the Diamond overlapping-generations model where individuals accumulate physical and human capital. The government provides transfers to the old, public education, infrastructure capital, and utility-enhancing public goods. We calibrate the model to the economy of Brazil. We find that reasonable reallocations from one type of expenditure to another do not have large growth effects. Openness of the economy matters for growth effects. However, when the full expenditure pattern of a non-populist country is imposed, there is growth increase of 0.30 percentage points per year. Due to the power of compounding, such increase can have sizable increases in income per capita of subsequent generations.

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## I. Introduction

Populism was a staple of Latin American economic policy in the 20th century. Populist governments typically advocate large government expenditures whose alleged purpose is to create employment, increase growth and redistribute wealth. Prior to the adoption of such policies, a country will have typically experienced stagnation or recession, which often leads to the emergence of a new, populist government. The administrations of Allende in Chile (1970-73), Peron in Argentina (1973-76), and Garcia in Peru (1985-90) are examples of such regimes. These populist administrations have been short-lived, but recurrent. While initially successful in their goals, populist disregard for economic constraints (e.g., the budget deficit, money creation, and foreign exchange constraints) has typically led to crisis, a deep recession, and change of government.

The short run effects of populist policies have been studied in the economic literature by Dornbusch and Edwards (1990, 1991), Sachs (1989), and Rosenstein-Rodan (1974), among others. This literature analyses the specific policies adopted, their initial effects, and the eventual crash. In contrast, our paper focuses on the long-run growth effects of populist policies which have received much less attention. We concentrate specifically on the growth effects of government expenditures, taxation, and public debt.[1] The paper, however, does not focus on specific populist episodes. In the last thirty years, several Latin American countries have had sizeable budget deficits, government expenditures, and an allocation of expenditures skewed away from productive investment towards transfers. Hence, we could argue that regardless of the political orientation of various administrations, several Latin American countries have indeed had "populist"

[1]There are other policies associated with populism like price controls, wage increases, and inflation financing that we abstract from.

budgets and expenditures over this extended time period. Table 1 presents Latin American data on government spending and its composition.[2] For example, between 1970 and 1994, Brazil's government spending was on average 40% of the country's gross domestic product per year. Further, about one-third of this (13% of GDP) was spent on social security and welfare expenditures, items which are typically emphasized by populist governments. Brazil's overall budget deficit over the same period was a very large 8% of GDP, more than three times the Latin American average. Other countries with similar fiscal pattern are Argentina and Panama. We ask the questions: What is the effect of such policies on long-run growth? How will future generations be affected?

Conversely, other countries, like the Dominican Republic, display a much different pattern. According to Table 1, government expenditures in the Dominican Republic were only 15% of GDP per year over the same period. The Dominican Republic only spent about 1% of yearly GDP on social security and welfare and had a relatively small deficit of 0.76% of GDP. Hence, not all Latin American countries have had "populist" budgets. Other countries with non-populist policies include Colombia and Costa Rica. Consequently another question of interest is: if Brazil had adopted instead, for instance, Costa Rican public expenditure patterns, how would have growth been affected?

We analyze these questions using a version of the Diamond overlapping-generations model. The single consumption good is produced with physical capital, human capital and infrastructure. Physical capital is accumulated in the standard way by savings of the young. New human capital is produced with human capital of the parents

[2] The data source is Government Finance Statistics Yearbook (IMF). Data on expenditures comes from "Table B. Expenditure by Function by Consolidated Central Government."

and a publicly provided input. In this model, there is a government that collects taxes on labor and capital income. The tax revenue is used to fund the following public expenditures: First, there are pure transfer payments to the old. This is like a PAYG social security system. Second, the government finances public education expenditures, which enhance the productivity of private inputs in education. Third, the government funds investment in infrastructure capital such as harbors, airports, and roads. Fourth, there are utility enhancing public expenditures such as expenditures on public parks or housing amenities. We allow the government to issue debt.

The model is calibrated to the Brazilian economy. Within the framework of our model, we perform a variety of policy experiments to study the growth effects of various fiscal policies. The policy experiments we consider are of the following types. First, we change the size of the public budget relative to GDP, leaving the composition of the government budget constant. Second, we change the composition of the government budget, keeping its size constant. We consider both a closed economy and a small open economy setting. Much of the previous work on the long run effects of fiscal policies that not only analyze taxation and government consumption, but also productive public expenditures, has been done in the context of a closed economy (e.g., Barro (1990), Baier and Glomm (2001), Baier, Bergstrand and Glomm (2003), Cassou and Lansing (1998, 2001), Glomm and Ravikumar (1994, 1998), Greiner and Hanusch (1998), Fischer and Turnovsky (1995) and Rioja (1999)). However, these Latin American countries are best described as small open economies. We consider both cases for comparison. We find that openness of the economy matters greatly for the growth effects of fiscal policies. Moreover, much of the above literature uses the infinitely lived agent framework. Here we use an OLG model where transfers (to the old) matter for growth.

## Table 1

## Latin American Data (percent of GDP)

| Country | Per capita growth rate (1970-1998) | Government Spending | Transfers | Education | Infrastructure | Public Goods | Overall Deficit or Surplus |
|---|---|---|---|---|---|---|---|
| Argentina (1973-1996) | 0.95 | 22.06 | 6.75 | 2.65 | 2.38 | 5.93 | -1.81 |
| Barbados (1972-1989) | 1.59 | 32.07 | 6.58 | 6.33 | 5.61 | 12.07 | -3.67 |
| Bolivia (1972-1997) | 1.55 | 16.39 | 2.00 | 3.61 | 2.86 | 8.01 | -3.41 |
| Brazil (1970-1994) | 2.32 | 40.21 | 13.22 | 1.88 | 4.99 | 10.77 | -8.08 |
| Chile (1972-1997) | 2.74 | 27.86 | 11.13 | 3.86 | 1.79 | 10.57 | -0.19 |
| Colombia (1971-1994) | 1.98 | 11.51 | 1.00 | 2.20 | 1.33 | 3.19 | -1.21 |
| Costa Rica (1972-1996) | 1.54 | 23.91 | 4.27 | 5.22 | 2.78 | 9.60 | -2.80 |
| Dominican R. (1972-1996) | 2.99 | 15.19 | 2.53 | 1.81 | 4.93 | 4.97 | -0.76 |
| Ecuador (1973-1997) | 2.17 | 13.91 | 0.35 | 3.52 | 2.71 | 5.42 | -0.74 |
| El Salvador (1970-1997) | 0.29 | 13.88 | 0.87 | 2.55 | 2.26 | 6.56 | -1.65 |
| Guatemala (1972-1997) | 1.03 | 10.52 | 0.93 | 1.59 | 1.43 | 4.94 | -1.81 |
| Mexico (1972-1996) | 1.59 | 18.66 | 3.19 | 2.96 | 3.52 | 2.53 | -4.54 |
| Panama (1973-1996) | 0.93 | 29.37 | 5.53 | 4.75 | 3.36 | 12.57 | -3.04 |
| Paraguay (1972-1993) | 2.07 | 10.67 | 2.39 | 1.44 | 1.74 | 4.25 | 0.19 |
| Peru (1980-1997) | 0.47 | 13.14 | 0.03 | 2.63 | 2.73 | 6.83 | -1.69 |
| Uruguay (1972-1997) | 1.70 | 26.27 | 13.83 | 2.11 | 1.92 | 7.55 | -1.98 |
| Venezuela (1972-1997) | -0.34 | 25.42 | 2.64 | 4.10 | 5.50 | 6.12 | -1.24 |
| Average | 1.50 | 20.65 | 4.79 | 3.13 | 3.05 | 7.24 | -2.26 |

Source: Government Finance Statistics Yearbook (IMF)

### II. The Model

The model we use is an overlapping generations model, where people live two periods, work in period 1 and are retired in period 2. We use an OLG framework rather than a model with infinitely lived agents because we want to explore the growth implications of public transfers. In the data, most transfers are transfers to the old. Such transfers only have a chance to influence growth in OLG models; in infinitely lived agent models lump-sum transfers do not influence growth. We abstract from population growth and normalize population size to unity. Within each generation all individuals are equal.

Each individual's preferences are given by

$$\ln c_t^a P_t^{1-a} + b \ln c_{t+1}^a P_{t+1}^{1-a}, \qquad 0 < b < 1, \qquad 0 < a < 1. \tag{1}$$

In equation (1), $c_t$ and $c_{t+1}$ are private consumption goods in periods 1 and 2 respectively and $P_t$ and $P_{t+1}$ are publicly provided goods in periods 1 and 2, respectively. We do not insist that $P_t$ and $P_{t+1}$ are public goods, only that these goods enhance utility and that they are publicly provided. Examples of such goods we have in mind are national parks, national holiday celebrations and museums.

The single private consumption good in period $t$ is produced using physical capital $K_t$, human capital $H_t$, and infrastructure capital $G_t$ as inputs, according to the Cobb-Douglas production

$$Y_t = A G_t^{\Psi} K_t^q H_t^{1-q}, \qquad A > 0, \qquad 0 < \Psi < 1, \qquad 0 < q < 1, \tag{2}$$

where $Y_t$ denotes output in period $t$.

Human capital is produced according to the Cobb-Douglas production function

$$h_{t+1} = B E_t^m h_t^r, \qquad B > 0, \qquad 0 < m < 1, \qquad 0 < r < 1. \tag{3}$$

According to this production function, future human capital $h_{t+1}$ is produced with current human capital $h_t$ and public education expenditures $E_t$. This is a technology that has been used by Benabou (1996), Fernandez and Rogerson (1998) and Kaganovich and Zilcha (1999). We do require that $m + r < 1$. In fact, in order to ensure balanced growth in this economy, since the production function for final consumption goods exhibits increasing returns to all augmentable factors, the production function for future human capital must exhibit just the right degree of decreasing returns. For a similar condition

see Baier, Bergstrand and Glomm (2003) and Baier and Glomm (2001). In fact, all growth models must obey a knife edge condition to ensure balanced growth.

The government collects taxes on labor and capital (interest) income at the uniform rates $t_{Lt}$ and $t_{Kt}$. Government revenue is used to finance four different government expenditures: public education $E_t$, investment in infrastructure $G_t$, utility enhancing expenditures $P_t$, and lump-sum social security transfers $T_t$. We always express the size of these programs relative to GDP. So $\Delta_{E,t}$ is the fraction of GDP allocated by the government to education, $\Delta_{T,t}$ is the fraction of GDP allocated by the government to social security payments, etc. We allow the government to run deficits and to borrow at the interest rate *r*. The government's budget can thus be written as

$$D_{t+1} + t_{L,t} w_t H_t + t_{K,t} q_t K_t = (\Delta_{T,t} + \Delta_{E,t} + \Delta_{G,t} + \Delta_{P,t}) Y_t + (1 + r_t) D_t , \tag{4}$$

where $D_t$ is the stock of public debt at time *t*, $\Delta_{s,t} Y_t$ is government expenditure on item *s*, $w_t$ is the real wage rate and $q_t$ is the rental price of capital.

Since in our model a period is thirty years, we assume that all capital stocks depreciate 100% between periods. We can thus write the laws of motion for human capital and for infrastructure capital as

$$H_{t+1} = B(\Delta_{E,t} Y_t)^m H_t^r \tag{5}$$

$$G_{t+1} = \Delta_{G,t} Y_t . \tag{6}$$

The household's maximization problem can be written as

$$\max_{\{c_t, c_{t+1}, s_t\}} \quad \ln c_t^a P_t^{1-a} + b \ln c_{t+1}^a P_{t+1}^{1-a}$$

$$s.t. \quad c_t + s_t = (1 - t_{L,t}) w_t h_t$$

$$c_{t+1} = (1 + (1 - t_{K,t}) r_{t+1}) s_t + T_{t+1}.$$

The individual's savings decisions are given by

$$(7) \qquad s_t = \frac{b}{1+b}(1 - t_{L,t}) w_t h_t - \frac{1}{(1+b)} \frac{T_{t+1}}{1 + (1 - t_{Kt}) r_{t+1}}.$$

Notice that expected transfer payments in old age decrease savings and thus influence growth. From the firm's profit-maximization problem we get

$$q_{t+1} = q \frac{Y_{t+1}}{K_{t+1}}$$

and

$$w_t = (1 - q) \frac{Y_t}{H_t}.$$

Most papers that study growth effects of fiscal policy reform, such as Lucas (1990), use only closed economy models. One exception is Mendoza and Tesar (1998), who study tax reform in a two country model. In this paper we consider two polar assumptions about openness of the economy. In the first case, we assume a small open economy. In the second case the economy is closed.

In the case of the small open economy, the world interest rate is fixed at the level $\overline{r_t}$. In this case we also allow individuals to hold foreign bonds. Letting $B_t$ denote foreign bond holdings in period *t*, the law of motion for $B_t$ becomes

$$B_{t+1} = (1 + \overline{r_t}) B_t + CA_t,$$

where $CA_t$ is the current account. We let $CA_t = gY_t$ with $0 < g < 1$ for all $t$ so that we can write

(8) $$B_{t+1} = (1+\bar{r}_t)B_t + gY_t.$$

In the small open economy the equilibrium condition for the credit market can be written as

$$K_{t+1} + D_{t+1} + B_{t+1} = S_t$$

$$= \frac{b}{1+b}(1-t_{L,t})w_t H_t - \frac{1}{(1+b)}\frac{T_{t+1}}{1+(1-t_{Kt})r_{t+1}}.$$

Using arbitrage and profit maximizing conditions we can write this as

(9) $$\left(1+\frac{\Delta_{T,t+1}}{(1+b)q}\right)K_{t+1} + D_{t+1} + B_{t+1} = \frac{b}{1+b}(1-t_{L,t})(1-q)AG_t^{\Psi}K_t^{q}H_t^{1-q}.$$

An equilibrium in this small open economy is completely characterized by equation (4) with the interest rate given by the world interest rate $\bar{r}_t$, equations (5), (6), (8) and (9).

In the closed economy version of this model there are only two differences to the open economy version. First, the interest rate is not fixed exogenously, but rather it is determined by the domestic marginal product of capital, so that we have

$$1+(1-t_{Kt})r_{t+1} = q_{t+1} = q\frac{Y_{t+1}}{K_{t+1}}.$$

Second, in the closed-economy version individuals do not have access to foreign bonds. We can thus write the credit market clearing condition as

$$K_{t+1} + D_{t+1} = \frac{b}{1+b}(1-t_{L,t})w_t H_t - \frac{1}{1+b}\frac{T_{t+1}}{1+(1-t_{K,t})}r_{t+1}$$

which, using profit-maximizing conditions, becomes

(10) $$\left(1+\frac{1}{1+b}\frac{\Delta_{T,t+1}}{q}\right)K_{t+1}+D_{t+1}=\frac{b}{1+b}(1-t_{L,t})(1-q)AG_t^{\Psi}K_t^{q}H_t^{1-q}.$$

An equilibrium for this closed economy is characterized by equations (4), (5), (6) and (10).

## III. Results for the open economy

In this section we present our numerical results. First, we calibrate the model to data from Brazil. We begin with the open-economy case. Table 2 contains the preference and technology parameters as well as the fiscal policy parameters and the world interest rate.

**Table 2**
**Parameter Values for Calibration**

| | |
|---|---|
| Discount factor $b$ | 0.4 |
| Capital's share of income $q$ | 0.45 |
| Public capital elasticity $Y$ | 0.15 |
| Public education expenditure elasticity $m$ | 0.1 |
| Parental human capital elasticity $r$ | 0.3 |
| Tax revenue as a fraction of GDP $t$ | 30.84% |
| Transfers as a fraction of GDP $)_T$ | 13.21% |
| Public education expenditure as a fraction of GDP $)_E$ | 1.88% |
| Infrastructure investment as a fraction of GDP $)_G$ | 4.99% |
| Utility enhancing public expenditures as a fraction of GDP $)_U$ | 10.76% |
| World interest rate $r$ | 4% |

A few comments on these parameter values are in order. The discount factor $ is set to 0.40 using Rios-Rull's (1996) calibration of an overlapping-generations model.[3] The parameter for capital's share of income, 2 = 0.45 may seem high relative to the U.S. value. However, Elias (1992) documents values for this parameter for Latin American

[3] Rios-Rull's (1996) estimate of 0.97 for $ uses yearly frequency. In our setting, that translates to (0.97)^30=0.40 since our unit of time is a 30-year generation.

economics around 0.50. Barro and Sala-i-Martin (1995) use a value of 0.45 for capital's share of income for Brazil.[4] Concerning the elasticity of public capital $Q$, since there are no specific estimates for these seven countries, we use an average of various estimates. This parameter has been estimated as large as 0.20 by Fay (2001) and Canning and Fay (1993) using large cross country data sets. Hulten (1996) estimates it around 0.10 using data from low- and middle-income countries, including six of the seven Latin American countries of interest. Canning and Bennathan (2000) also estimate it at about 0.10. We take the midpoint of these estimates and set it to 0.15 in the benchmark.[5]

There is a myriad of estimates of education production functions for the U.S. This literature is surveyed by Hanushek (1986,1996), Hedges and Greenwald (1996) and Harris (2000). Estimates of the public expenditure elasticity $m$ lie roughly between 0.1 (Card and Krueger (1992)) and zero, which is Hanushek's preferred estimate. Betts (1996) documents that in the U.S. estimates of $m$ are higher the older the data set used; presumably, for older data sets, average income is lower and public education expenditures may be more effective. For this reason, we choose a value of $m$ which is towards the high end of the estimated range.

Our model exhibits increasing returns to scale in the augmentable factors in the production function for final goods and services. In order to avoid exploding growth rates the technology to produce future human capital must exhibit just the right degree of decreasing returns. This knife-edge requirement is similar to the one in Baier, Bergstrand

[4] However, Gollin (2002) shows that for many countries, capital's share of income is below 0.35.
[5] There are many estimates available for the public infrastructure elasticity for the U.S. economy. Apart from the initial estimates by Aschauer (1989), most more recent estimates lie between 0.2 for the time series estimates such as Ai and Cassou (1995) and Lynde and Richmond (1993) and values very close to zero such as the estimates from Hulten and Schwab (1991) and Holtz-Eakin (1994).

and Glomm (2003). The value of $r$ which provides the right balance between increasing and decreasing returns is $r = 0.3$.

The fiscal policy parameters are chosen to match averages for Brazil over the period 1970-1994. The choice of the annual real world interest rate follows Rebelo and Vegh (1995). Finally, the scale parameters in the two technologies A and B are chosen so that the annual long-run growth rate of real per capita GDP matches the Brazilian average growth rate of 2.31. We run the economy for 20 periods. By period 15 the economy has settled down sufficiently close to a balanced growth path with a change in the growth rate between periods being smaller than $6*10^{-5}$.

We are now in a position to carry out policy experiments. All of our policy reforms kick in in period 15, which we will call Generation 1, and are assumed to be permanent. The first set of experiments we consider are shifts in public funds from transfers to education expenditures. The results of these policy reforms are summarized in Table 3.

**Table 3**
**Shifting public funds from transfers to education**

| Generation | -1% | Benchmark | +1% | +2% | +3% | +4% | +5% |
|---|---|---|---|---|---|---|---|
| 1 | 2.1498 | 2.3121 | 2.4124 | 2.4890 | 2.5529 | 2.6092 | 2.6602 |
| 2 | 2.2361 | 2.3121 | 2.3567 | 2.3892 | 2.4152 | 2.4372 | 2.4565 |
| 3 | 2.2811 | 2.3121 | 2.3301 | 2.3431 | 2.3533 | 2.3619 | 2.3694 |
| 4 | 2.2999 | 2.3122 | 2.3191 | 2.3243 | 2.3283 | 2.3317 | 2.3346 |
| 5 | 2.3074 | 2.3122 | 2.3149 | 2.3169 | 2.3185 | 2.3198 | 2.3209 |

In Table 3 the first row indicates the shift in public funds from transfers to public education expenditures. The -1% in the second column means that public education expenditures have been decreased by 1% of GDP (from 1.88% of GDP to 0.88% of GDP) and that transfers have been increased by 1% of GDP, while in column 5, the +3% indicates an increase in public education funding by 3% of GDP from 1.88% to 4.88% of

GDP, at the expense of public transfers. As is evident from Table 3, reallocating public funds from transfers to public education increases the growth rate. This is in accord with intuition; after all, increasing public education spending increases human capital accumulation and hence growth, while increased transfers to the old diminish the incentive to save/invest in physical capital (see equation (7)) and hence growth. But these growth effects are not large. Increasing public education expenditures from 1.99% of GDP (in the benchmark) to 6.99%, a 5% of GDP increase in funding, only increases the annual real growth rate of GDP from 2.31% to 2.66% for generation 1. Of course the 0.35 percentage point raise in growth will get compounded over a 30 year generation. Similarly, cutting public education expenditures by 1% of GDP from the benchmark case decreases growth only from 2.31% to 2.15%. These relatively modest growth effects of fairly drastic policy changes are obtained with a public education elasticity $m$ of 0.15, which is most likely not too small. It is also evident from Table 3 that these growth effects decline monotonically over time so that by generation 5 there are basically no growth effects even of a large policy change.

In the next policy experiment, we reallocate public funds from transfers to investment in infrastructure. The results are summarized in Table 4.

**Table 4**
**Shifting public funds from transfers to infrastructure investment**

| Generation | -4% | -3% | -2% | -1% | Bench-mark | +1% | +2% | +3% | +4% | +5% |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.4101 | 1.7839 | 2.0108 | 2.1778 | 2.3121 | 2.4259 | 2.5256 | 2.6150 | 2.6967 | 2.7724 |
| 2 | 2.1266 | 2.2036 | 2.2503 | 2.2846 | 2.3121 | 2.3354 | 2.3559 | 2.3742 | 2.3909 | 2.4063 |
| 3 | 2.2591 | 2.2812 | 2.2945 | 2.3043 | 2.3121 | 2.3188 | 2.3246 | 2.3298 | 2.3346 | 2.3390 |
| 4 | 2.2937 | 2.3014 | 2.3060 | 2.3094 | 2.3122 | 2.3145 | 2.3165 | 2.3183 | 2.3200 | 2.3215 |
| 5 | 2.3052 | 2.3081 | 2.3099 | 2.3111 | 2.3122 | 2.3130 | 2.3138 | 2.3145 | 2.3151 | 2.3157 |

Again the growth effects of substantial reallocations of public expenditures are rather moderate. Shifting public funds equal to 5% of GDP from transfers to infrastructure investment and thereby doubling infrastructure investment (from 4.99% of GDP to 9.99% of GDP) only increases the growth rate from the benchmark of 2.31% to 2.77%. For every 1% of GDP of reallocation, there is about a 0.10 percentage point increase in the growth rate of generation 1. Note however that reducing infrastructure by 4% in favor of transfers does decrease growth substantially to 1.41%. But no one, to our knowledge, is really advocating such a large drop in infrastructure investment. Again, by generation 5 the growth effects of policy reform have disappeared.

In Table 5 we show the growth effects of shifting public funds between the two productive investments, infrastructure and education.

**Table 5**
**Shifting public funds from education to infrastructure investment**

| Generation | -3% | -2% | -1% | -0.5% | Benchmark | +0.5% | +1% | +1.5% |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.0212 | 2.1861 | 2.2777 | 2.3023 | 2.3121 | 2.3030 | 2.2632 | 2.1468 |
| 2 | 2.3062 | 2.3271 | 2.3291 | 2.3234 | 2.3121 | 2.2929 | 2.2594 | 2.1883 |
| 3 | 2.3222 | 2.3254 | 2.3223 | 2.3183 | 2.3121 | 2.3028 | 2.2877 | 2.2570 |
| 4 | 2.3175 | 2.3182 | 2.3165 | 2.3147 | 2.3122 | 2.3083 | 2.3022 | 2.2899 |
| 5 | 2.3144 | 2.3146 | 2.3139 | 2.3132 | 2.3122 | 2.3106 | 2.3082 | 2.3034 |

As is evident from Table 5, deviating from the current allocation of public funds between education and infrastructure investment decreases growth, so that the current allocation is roughly growth maximizing. This is quite remarkable since the allocation to infrastructure exceeds the allocation for public education by roughly 150%, while the coefficients on both of these public inputs are very similar. The growth effects of deviating from the status quo allocation of public education and infrastructure are rather small. Notice also that the growth maximizing allocation between education and infrastructure varies between the short-run and the long-run: In the short-run the growth

maximizing allocation is 1.88% of GDP to education and 4.99% of GDP to infrastructure, while in the long-run, shifting resources from infrastructure to education by about 2% of GDP is growth maximizing (see "-2%" column on Table 5). But again even in the long-run, the growth effects of rather sizeable policy changes turn out very, very small. The findings of a hump shape relationship between growth and the allocation between the two types of public investment is similar to the one in Baier, Bergstrand and Glomm (2003).

## IV. Results for the closed economy

In this section we present the results for the closed economy. Of course, we have to change to calibration. We keep the preference and technology parameters the same as in Table 1. We change the scale parameters A and B in the two technologies in order to get growth to match Brazil's growth rate of 2.32%. In this case we no longer fix the (world) interest rate, but let it be determined endogenously. The policy parameters are exactly the same as in Table 1 to match Brazil's fiscal policy.

In Table 6 we report results for reallocating funds between transfers and education. The policy reforms are exactly analogous to those in Table 3.

**Table 6**
**Shifting public funds from transfers to public education (closed economy)**

| Generation | -1% | Benchmark | +1% | +2% | +3% | +4% | +5% |
|---|---|---|---|---|---|---|---|
| 1 | 2.1587 | 2.3210 | 2.4213 | 2.4979 | 2.5618 | 2.6180 | 2.6691 |
| 2 | 2.0912 | 2.3210 | 2.4548 | 2.5533 | 2.6324 | 2.6995 | 2.7584 |
| 3 | 2.0559 | 2.3210 | 2.4717 | 2.5815 | 2.6684 | 2.7411 | 2.8041 |
| 4 | 2.0373 | 2.3210 | 2.4799 | 2.5955 | 2.6864 | 2.7621 | 2.8272 |
| 5 | 2.0272 | 2.3210 | 2.4837 | 2.6022 | 2.6953 | 2.7723 | 2.8386 |

It is worthy of note that the growth effects of reallocating public funds from transfers to public education are uniformly higher in the closed than in the open economy. In the first generation, when this policy reform is implemented, these growth effect differences are

small. Notice, however, that in the open economy growth-rate effects fell over time, while growth-rate effects rise over time in the closed economy. The reason for this difference is that increased public expenditures on education raise human capital accumulation, which in turn raises the marginal product of capital, the interest rate and thus the incentive to invest in physical capital. In the closed economy, the interest rate is allowed to increase over time as the stock of human capital raises due to higher public education funding. This allows the growth rate to increase.

In the second experiment, we reallocate funds from transfers to infrastructure investment. The results are illustrated in Table 7. Again, the growth effects of increasing infrastructure investment at the expense of transfers has bigger growth effects than in the open economy. As before we attribute this differential outcome to the fact that in the closed economy the interest rate is allowed to adjust.

**Table 7**
**Shifting public funds from transfers to infrastructure (closed economy)**

| Generation | -4% | -3% | -2% | -1% | Bench-mark | +1% | +2% | +3% | +4% | +5% |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.4189 | 1.7928 | 2.0196 | 2.1866 | 2.3210 | 2.4347 | 2.5344 | 2.6238 | 2.7056 | 2.7813 |
| 2 | 1.7284 | 1.9730 | 2.1226 | 2.2321 | 2.3210 | 2.3946 | 2.4599 | 2.5185 | 2.5719 | 2.6214 |
| 3 | 1.8884 | 2.0672 | 2.1755 | 2.2552 | 2.3210 | 2.3734 | 2.4208 | 2.4634 | 2.5023 | 2.5382 |
| 4 | 1.9702 | 2.1151 | 2.2024 | 2.2666 | 2.3210 | 2.3619 | 2.4002 | 2.4344 | 2.4658 | 2.4947 |
| 5 | 2.0132 | 2.1395 | 2.2159 | 2.2721 | 2.3210 | 2.3555 | 2.3890 | 2.4190 | 2.4464 | 2.4718 |

The results for reallocating public funds from education to infrastructure are reported in Table 8.

**Table 8**
**Shifting public funds from education to infrastructure (closed economy)**

| Generation | -3% | -2% | -1% | -0.5% | Bench-mark | +0.5% | +1% | +1.5% |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.0300 | 2.1949 | 2.2866 | 2.3112 | 2.3121 | 2.3118 | 2.2720 | 2.1556 |
| 2 | 2.2835 | 2.3547 | 2.3665 | 2.3518 | 2.3121 | 2.2641 | 2.1654 | 1.9538 |
| 3 | 2.4144 | 2.4369 | 2.4074 | 2.3724 | 2.3121 | 2.2390 | 2.1099 | 1.8492 |
| 4 | 2.4817 | 2.4790 | 2.4281 | 2.3825 | 2.3121 | 2.2256 | 2.0807 | 1.7948 |
| 5 | 2.5160 | 2.5002 | 2.4383 | 2.3873 | 2.3121 | 2.2182 | 2.0652 | 1.7663 |

Table 8 indicates that reallocating public funds between education and infrastructure has minimal growth effects in the current generation. Only over time do growth effects of such a policy reform become substantial. For example, five generations after increasing infrastructure investment at the expense of public education by 1.5 percentage points of GDP decreases growth from 2.3% to 1.8%. As in Table 5, the growth maximizing allocation between infrastructure and education is different in the short-run and the long-run. In the short-run (Generation 1) the benchmark is growth maximizing, while in future generations the growth maximizing allocation gradually shifts in favor of education.

## V. Deficits

In this section we repeat our policy experiments, but we allow for public sector debt. Studying this case seems especially relevant since populists in Latin America seem to have generated, at least in some countries, sizeable public sector deficits. We repeat the policy experiments here for the closed economy assuming that in Generation 1, when the policy reform sets in the public sector deficit is 4% of GDP and that the debt is entirely paid off in the following generation.

Table 9 illustrates the results for a reallocation from transfers to public education.

**Table 9**
**Shifting public funds from transfers to public education in the presence of public debt**

| Generation | -1% | Benchmark | +1% | +2% | +3% | +4% | +5% |
|---|---|---|---|---|---|---|---|
| 1 | 2.1589 | 2.3212 | 2.4216 | 2.4981 | 2.5621 | 2.6183 | 2.6693 |
| 2 | 1.5636 | 1.8160 | 1.9752 | 2.0982 | 2.2017 | 2.2930 | 2.3759 |
| 3 | 3.1781 | 3.4355 | 3.5809 | 3.6831 | 3.7623 | 3.8272 | 3.8825 |
| 4 | 2.8922 | 3.1711 | 3.3295 | 3.4416 | 3.5188 | 3.6006 | 3.6619 |
| 5 | 2.7441 | 3.0339 | 3.1991 | 3.3161 | 3.4075 | 3.4828 | 3.5472 |

Comparing Tables 6 and 9 reveals that the growth rate effects of reallocating funds from transfers to education are almost completely unaffected by the presence of the public debt in the short-run (Generation 1). In the long-run, however, the growth effects of this policy change are much larger. For example, raising public education expenditures by three percentage points of GDP raises growth in Generation 5 to 3.4% when there are deficits in Generation 1, but only 2.7% when the government budget is always balanced.[6]

The results from reallocating public funds from transfers to infrastructure under four percent are very similar to the effects of reallocating from transfers to public education: The growth effects are relatively small in the short-run and sizeable in the long-run. Hence, we omit presenting these results for brevity.

The effects of reallocating public funds from education to infrastructure are illustrated in Table 10. In this case, the long-run the growth maximizing allocations between public education and infrastructure are similar in the short-run and long-run. Growth is maximized by reallocating in favor of education by 2.5 or 3 percentage points of GDP from the benchmark.

For all the policy reforms in this section, we assumed the economy is closed and that the deficit of 4% of GDP from Generation 5 is paid off during the following

[6] In all results in Table 9, note that growth in generation 2 is much lower than in generation 1 since the debt from the previous period must be paid off. Once this debt is paid, however, generation 3, 4, and 5 can enjoy much larger growth rates.

generation. A 4% deficit is low relative to the data for Brazil (8% on average). We experimented with larger deficits. As the deficits approach Brazilian levels, the tax rates required to pay off the debt in Generation 2 rises above 100%. Thus our theory predicts that large deficits of the size observed in Brazil are not sustainable in a closed economy. In the case of the open economy, even very large deficits that by far exceed those deficits in Brazil have a negligible impact on the growth rate.

**Table 10**
**Shifting public funds from education to infrastructure in the presence of public debt**

| Generation | -3% | -2.5% | -2% | -1.5% | -1% | -0.5% | Bench-mark | +0.5% | +1% | +1.5% |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.4530 | 2.4562 | 2.4430 | 2.4152 | 2.3752 | 2.3114 | 2.3212 | 2.3121 | 2.1758 | 1.9385 |
| 2 | 1.9955 | 1.9927 | 1.9763 | 1.9475 | 1.9056 | 1.8477 | 1.8160 | 1.7604 | 1.6144 | 1.3450 |
| 3 | 3.6460 | 3.6400 | 3.6214 | 3.5910 | 3.5478 | 3.4893 | 3.4355 | 3.3545 | 3.1978 | 2.9014 |
| 4 | 3.3941 | 3.3866 | 3.3671 | 3.3364 | 3.2935 | 3.2359 | 3.1711 | 3.0776 | 2.9184 | 2.6135 |
| 5 | 3.2635 | 3.2551 | 3.2352 | 3.2043 | 3.1616 | 3.1044 | 3.0339 | 2.9341 | 2.7736 | 2.4644 |

**VI. Costa Rica and Brazil: a case study**

As described in Table 1 in the introduction, Brazilian data shows that the country ran some of the largest budget deficits in the region (about 8% of GDP), had the largest government expenditures (40% of GDP), and emphasized expenditures on transfers (about 13% of GDP) at the cost of public education expenditures. Hence, Brazil's data fits the populist pattern very well. Conversely, Costa Rica shows quite a different pattern. Costa Rica shows a moderate budget deficit (2.8% of GDP), government expenditures are only about 24% of GDP, and spending on education and infrastructure received larger shares than transfers. We will refer to the Costa Rican pattern as "non-populist."

Here we address the question: If Costa Rican fiscal patterns had been imposed in Brazil, how would Brazilian growth performance be affected? This section analyses this case in detail. In particular, two experiments are conducted. 1.) Imposing the Costa Rican expenditure pattern while keeping *total* expenditures at Brazilian levels. 2.) Imposing Costa Rican expenditure patterns *and* total expenditure level.

Results for both these specifications in the open economy case are described on Table 11. Concerning the first experiment, the growth rate of Generation 1 under the non-populist regime would have been 2.5976% per year rather than 2.3121% in the populist regime. This is an increase of about 0.30 percentage points in the growth rate, which is fairly sizable. Moreover, income per capita in Brazil would be $4,892 vs. $4,500 in Generation 1. Differences in income per person get compounded and are even wider in subsequent generations as Table 11 shows. By generation 5, the income difference is over $11,000, even though growth rates in the two cases are converging.

**Table 11**
**Imposing non-populist policies**

| Generation | Brazil Benchmark | | Non-populist Regime 1 | | Non-populist Regime 2 | |
|---|---|---|---|---|---|---|
| | Growth | Income | Growth | Income | Growth | Income |
| 1 | 2.3121 | $4,500 | 2.5976 | $4,892 | 2.3941 | $4,609 |
| 2 | 2.3121 | $8,934 | 2.4475 | $10,106 | 2.3864 | $9,352 |
| 3 | 2.3121 | $17,735 | 2.3672 | $20,388 | 2.3460 | $18,752 |
| 4 | 2.3121 | $35,208 | 2.3341 | $40,738 | 2.3259 | $37,378 |
| 5 | 2.3121 | $69,896 | 2.3207 | $81,078 | 2.3176 | $74,323 |

In the second experiment, Costa Rican expenditure allocations *and* total expenditures are imposed. The major difference is that total government expenditures are almost cut in half compared to Brazil's. Nevertheless, as Table 11 shows, Brazil's growth rate would have been higher under this "non-populist" regime. Generation 1's growth rate is 2.3941 vs. 2.3121; this is not quite as high a change as under experiment 1). Hence,

even cutting total expenditures by one-half, by changing the expenditure shares to emphasize education and public infrastructure and de-emphasize transfers, would yield higher growth.

## VII. Concluding Remarks

In this paper we have studied the impact of some populist fiscal policies on long-run growth. The findings in this paper are: (i) In the small open economy setting, growth effects of any single policy reform are small. (ii) Imposing an entire set of non-populist policies can increase growth by about 0.3 percentage point per year. (iii) Growth effects of fiscal policy reform are larger in the closed economy model than in the open economy since the interest rate can adjust.

Running deficits influences the growth effects of reforms of other dimensions of fiscal policy. Increasing the public debt for one generation and paying the entire debt off in the next generation in our model has minute growth effects in the open economy version, since the interest rate is fixed. In our calibrated closed economy version, raising public debt to around 5% of GDP raises the interest payments for the next period to unsustainable levels. Further investigation of the growth effects of debt in these settings with other populist policies is left for future research with a model with more detailed demographic structure and with more and longer data sets.

One aspect of populist policies which we have not addressed in this paper is the government's decision to have large, perhaps excessively large, public sector employment. Such labor market policies, by influencing rates of return on capital, might have sizeable growth effects as well. This is left for future research.

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