Fiscal Policy and Productivity Growth in the OECD

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Abstract

We use a simple endogenous growth model with productive public capital to investigate the degree to which observed fiscal policies in eight OECD countries can account for slowdowns in the growth rates of aggregate labor productivity since 1970. In model simulations, we find that none of the observed public capital policies can generate slowdowns of sufficient magnitude to match those in the data. For most countries in our sample, a simulation that combines the observed public capital policy with the observed tax policy does a better job of accounting for the slowdown than either policy in isolation.

Keywords: Fiscal Policy, Infrastructure, Growth, Public Investment.


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1 Introduction

Considerable effort has been devoted to investigating potential causes of the well-documented slowdowns in the growth of aggregate labor productivity in many developed countries beginning in the late 1960s or early 1970s. Interest in this phenomena extends well beyond mere intellectual curiosity because small changes in a country’s growth rate can have profound impacts on standards of living when compounded over time. One hypothesis for the cause of the slowdowns, put forth most notably by Aschauer (1989a,b) and Munnell (1990), is that policymakers have allowed stocks of public infrastructure capital to fall below optimal levels, thus hindering the productivity of complementary private-sector inputs. Support for this so-called “public capital hypothesis” is derived primarily from simple empirical methods aimed at estimating the parameters of an aggregate production technology. Such methods typically yield large point estimates for the output elasticity of public capital, suggesting the presence of substantial unexploited gains to expanding infrastructure investment. This kind of result has stimulated a large number of follow-up studies that attempt to confirm or refute the findings.\footnote{See Sturm, Kuper, and de Haan (1998) for an extensive review of this literature.}

An important limitation of many empirical studies, however, is that they do not impose the full set of restrictions implied by the optimization problems of rational economic agents, thus making results susceptible to Lucas’s (1976) econometric policy critique. For example, the use of standard growth accounting techniques to assess the contribution of public capital to the productivity slowdown fails to control for simultaneous changes in tax policy that are clearly evident in the data.

In an earlier paper, Cassou and Lansing (1998), we developed a general-equilibrium endogenous growth model suitable for comparing the quantitative growth effects of optimal and nonoptimal fiscal policies. We examined the possible link between trends in U.S. fiscal policy variables and the post-1970 slowdown in the growth rate of U.S. labor productivity. We demonstrated that a declining ratio of public-to-private capital consistent with that observed in the data does not have much impact on the growth rate of labor productivity in a reasonably parameterized model. Our results further suggested that the trend of rising U.S. tax rates should be given more attention as a possible explanatory factor in the slowdown.

In this paper, we extend the analysis of Cassou and Lansing (1998) to a total of eight OECD economies (U.S., Canada, Australia, Belgium, Finland, Germany, Norway, U.K). The
data analysis reveals that only four of the eight countries exhibit declining public capital ratios in the years following 1970. This fact alone serves to cast doubt on the public capital hypothesis an explanation for the widespread slowdowns. We use our model’s equilibrium conditions to restrict the choice of parameter values so that the resulting artificial economy matches various empirical facts observed in each of the eight OECD countries. Once we have what we think are reasonable parameter values, our “growth accounting” exercise takes the form of controlled simulation experiments that isolate the impact of (i) public capital and (ii) tax rates in accounting for the historically observed productivity slowdowns.

We relax our earlier assumption that pre-1970 fiscal policy was optimally chosen. Instead, we take fiscal policy to be completely exogenous here and assume that each country’s economy exhibits balanced growth in 1970—an assumption that leads to a larger value of public capital’s output elasticity in our calibration procedure. All else equal, a larger output elasticity will lend support to the public capital hypothesis in those countries where a declining ratio of public-to-private capital is observed. Despite a larger output elasticity, our findings are essentially unchanged: the public capital hypothesis does not, by itself, provide a convincing explanation for the productivity slowdowns in any of the countries examined.

All eight of the countries in our sample exhibit rising average tax rates in the years after 1970. In most cases, we find that a simulation which combines the observed public capital policy with the observed tax policy does a better job of accounting for the post-1970 growth experience.

The remainder of this paper is organized as follows. Section 2 summarizes observed trends in labor productivity and fiscal policy variables in eight OECD countries. Section 3 presents our model. Section 4 describes the calibration procedure. Section 5 presents our quantitative results. Section 6 concludes.

2 Trends in Productivity and Fiscal Policy

Our analysis focuses on eight developed economies: the U.S., Canada, Australia, Belgium, Finland, Germany, Norway, and the U.K.\textsuperscript{2} This set was chosen based on the availability of

\textsuperscript{2}We include the U.S. because the calibration procedure used here differs significantly from that used in our earlier paper (Cassou and Lansing, 1998). Specifically, we relax our earlier assumption that pre-1970 fiscal policy was optimally chosen and instead assume that each country’s economy exhibits balanced growth at the observed 1970 fiscal policy.
reliable capital stock data.\textsuperscript{3} Table 1 reports pre- and post-1970 labor productivity growth rates which clearly illustrate the slowdowns.\textsuperscript{4} Since most studies trace the start of the slowdowns to around 1970, we focus our attention on the growth-reducing effects of observed fiscal policies in the post-1970 sample period.\textsuperscript{5} 

<table>
<thead>
<tr>
<th>Table 1: Pre- and Post-1970 Labor Productivity Growth Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Growth Rate</td>
</tr>
<tr>
<td>Growth Rate</td>
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</table>

Figures 1 and 2 show the trends in fiscal policy variables for each country. Figure 1 plots the ratio of public-to-private capital while Figure 2 plots gross government tax receipts as a percentage of GDP—a measure of the average tax rate. Only four of the eight countries (U.S., Canada, Australia, and Belgium) exhibit declining public capital ratios in the years following 1970. The post-1970 ratios are increasing for Finland and Norway and nearly constant for Germany and the U.K. In contrast, all eight countries exhibit rising average tax rates over the sample period, consistent with a general trend of expanding public sectors in the OECD.\textsuperscript{6}

\textsuperscript{3}The U.S. capital stock data are from \textit{Fixed Reproducible Tangible Wealth in the United States}, U.S. Department of Commerce (1993). See Cassou and Lansing (1998, footnote 15) for further details on U.S. data sources. The U.K. capital stock data are from Ford and Poret (1991, Table A5). For the remaining countries, capital stock data are from \textit{Flows and Stocks of Fixed Capital}, published periodically by the OECD, where private capital is defined as the sum of the stocks in Agriculture, Industry, and Services. Labor force data are from the “Civilian employment” tables in \textit{Labour Force Statistics}, published by the OECD. Average tax rate data are from the “Total tax revenue as percentage of GDP” tables in \textit{Revenue Statistics of OECD Member Countries 1965-1994}, published by the OECD. Data for government expenditures, GDP, and population are from \textit{International Financial Statistics}, published by the International Monetary Fund. The years for which appropriate data was available differed across countries, as can be seen in Figures 1 and 2. In the case of Germany, data beyond 1989 was not used because of the potentially distorting effects of the reunification with East Germany.

\textsuperscript{4}We define U.S. labor productivity as real GDP divided by aggregate labor hours (LHOURS from Citibase). For the remaining countries, reliable data on aggregate labor hours are not available so we define labor productivity as real GDP divided by the size of the civilian labor force.


\textsuperscript{6}See de la Fuente (1997) for further documentation and analysis of this trend.
3 The Model

The model is identical to that presented in Cassou and Lansing (1998) with two exceptions: (1) we take fiscal policy to be exogenous and (2) we allow public and private capital to exhibit different depreciation properties.

3.1 The Private Sector

The private sector consists of a large but fixed number of households, each of which is the owner of a single firm that produces output $y_t$ according to

$$y_t = A_0 k_t^\theta_1 (l_t h_t)^{\theta_2} k_{gt}^{\theta_3},$$

where $k_t$ is the per capita stock of private capital, $l_t$ is the per capita labor supply and $k_{gt}$ is the per capita stock of public capital. Firms choose $k_t$ and $l_t$ to maximize profits but take $k_{gt}$ as exogenously supplied by the government. Output is also affected by $h_t$, which is an index of knowledge that augments the productive capacity of labor but is outside the firm’s control. Following Arrow (1962) and Romer (1986), the mechanism for knowledge accumulation is “learning by doing” such that $h_t = \bar{k}_t$, where $\bar{k}_t$ is the average capital stock across firms. In equilibrium we have $h_t = \bar{k}_t = k_t$ which is imposed after firms choose their optimal capital and labor input levels.

The equilibrium technology exhibits constant returns to scale in the two reproducible factors $k_t$ and $k_{gt}$ which allows for sustained endogenous growth. Since $\theta_1 + \theta_2 + \theta_3 = 1$, firms earn an economic profit equal to the difference between the value of output and payments made to the private-sector inputs. We assume that profits are distributed to households as dividends and taxed as ordinary income. The market clearing prices for private capital and labor inputs and the resulting firm profits $\pi_t$ are given by

$$r_t = \theta_1 y_t / k_t.$$

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7 See McGrattan (1998) for a variety of empirical evidence in support of “$Ak$” type endogenous growth models.

8 Basu and Fernald (1997) report that the typical U.S. industry exhibits decreasing returns to scale in private inputs. Empirical research that explicitly considers public capital as an input to production finds support for a technology specification with $\theta_1 + \theta_2 + \theta_3 = 1$. See, for example, Ai and Cassou (1995), Munnell (1990), and Aschauer (1989a).
\[ w_t = \theta_2 y_t / l_t, \quad \text{(3)} \]
\[ \pi_t = (1 - \theta_1 - \theta_2) y_t. \quad \text{(4)} \]

The infinitely-lived representative household chooses \( \{c_t, l_t, i_t, k_{t+1}\}_{t=0}^{\infty} \) to maximize
\[
\sum_{t=0}^{\infty} \beta^t \log(c_t - Bh_t l_t^\gamma), \quad \beta \in (0, 1),
\]
\[ B > 0, \quad \gamma > 1, \quad \text{(5)} \]
subject to
\[
c_t + i_t = (1 - \tau_t)(w_t l_t + r_t k_t + \pi_t), \quad \text{(6)}
\]
\[
k_{t+1} = A_1 k_t^{1-\delta} i_t^\delta, \quad A_1 > 0, \quad \delta \in (0, 1],
\]
\[ k_0 \text{ given}, \quad \text{(7)} \]

where \( \beta \) is the household discount factor, \( \frac{1}{\gamma-1} \) is the elasticity of household labor supply, \( c_t \) is private consumption, \( i_t \) is private investment, and \( \tau_t \) is the income tax rate.\(^9\) The household takes \( \tau_t, h_t \), and \( \pi_t \) as determined outside of its control. Investment adds to the stock of private capital according to the law of motion (7) which can be interpreted as reflecting adjustment costs or capturing the behavior of an aggregate stock that is measured by adding up capital types with different depreciation characteristics. Standard techniques yield the decision rules

\[
c_t = (1 - a_0)(1 - \tau_t)y_t, \quad a_0 \equiv \frac{\beta \theta_1}{1 - \beta(1 - \delta)} , \quad \text{(8)}
\]
\[
i_t = a_0 (1 - \tau_t)y_t, \quad \text{(9)}
\]
\[
l_t = \left[ (1 - \tau_t) \left( \frac{\theta_2 A_0}{\gamma B} \right) \left( \frac{k_{gt}}{k_t} \right)^{\theta_3} \right]^{\frac{1}{\gamma - \theta_2}}. \quad \text{(10)}
\]

### 3.2 The Public Sector

We assume that the government sets public investment \( i_{gt} \), nonproductive public expenditures \( g_t \), and the income tax rate \( \tau_t \) according to the following balanced-budget policy rules:

\[
i_{gt} = \alpha y_t, \quad \alpha \in [0, 1), \quad \text{(11)}
\]
\[
g_t = \phi y_t, \quad \phi \in [0, 1), \quad \text{(12)}
\]
\[
\tau_t = \alpha + \phi, \quad \alpha + \phi \in [0, 1), \quad \text{(13)}
\]

\(^9\)The utility function (5) can be interpreted as the reduced form of a specification where \( h_t \) governs the productivity of work done at home. Alternatively, we may interpret foregone leisure as being adjusted for “quality.”
for all $t \geq 0$. Public investment contributes to the stock of public capital according to the following law of motion, which is analogous to (7):

$$k_{gt+1} = A_1 k_{gt}^{1-\delta_g} \delta_g, \quad A_1 > 0, \quad \delta_g \in (0, 1], \quad \text{given.}$$

(14)

Given the above policy rules, it is straightforward to show that the model possesses a unique balanced growth path. Imposing the restrictions $\alpha = \frac{\delta_0 \theta_2}{1-\beta(1-\delta_g)}$ and $\delta_g = \delta$ recovers the optimal fiscal policy derived in Cassou and Lansing (1998).

4 Calibration

Parameter values are chosen to match various empirical observations. Some of these observations are specific to individual countries while others are assumed to be common to all countries. We depart from the calibration procedure in Cassou and Lansing (1998) by relaxing the assumption that pre-1970 fiscal policy was optimally chosen. Instead we assume that each country’s economy exhibits balanced growth at the observed 1970 fiscal policy.

For all countries, we choose $\gamma = 1.60$ (which implies a labor supply elasticity of 1.7) and $\delta = 0.1$ consistent with the values used in Cassou and Lansing (1998). For the U.S., Canada, Germany, and the U.K., labor’s share of output $\theta_2$ is set to the factor share estimates in Christensen, Cummings and Jorgenson (1980). For the remaining countries, we adopt a mid-range value of $\theta_2 = 0.6$. Given values for $\gamma$, $\delta$, $\theta_2$, and defining $\theta_1 = 1-\theta_2 - \theta_3$, we choose the remaining eight parameters $\theta_3$, $\delta_g$, $B$, $A_0$, $A_1$, $\beta$, $\alpha$, and $\phi$, so that each country’s balanced growth path displays eight characteristics which are listed in the top panel of Table 2. We calibrate the balanced growth rate of $y_t$ in the model to match the pre-1970 average growth rate of labor productivity in each country. This allows us to investigate the degree to which fiscal policies in the years following 1970 can account for the historically observed slowdowns. Table 2 summarizes the resulting parameter values for each country.

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\[10\] Our earlier paper showed that the U.S. ratio of public-to-private capital from 1925 to 1970 evolves in a manner that is broadly consistent with the transition path implied by optimal fiscal policy.

\[11\] With the exception of Belgium and Finland, the sample periods used to compute the average growth rates are shown in the first row of Table 1. The short sample periods prior to 1970 for Belgium and Finland yielded unrealistically high average growth rates. To avoid this problem, we calibrated the model to match the average growth rates of per capita output (instead of labor productivity) from 1955-1970 for Belgium and 1960-1970 for Finland. Our model implies that labor productivity $\frac{y_t}{l_t}$ and per capita output $y_t$ will grow at the same rate along the balanced growth path.
Table 2 also includes the balanced-growth ratio of public-to-private capital $R^*$, the tax rate $\tau^*$, and the balanced growth rate $\mu^*$ that are implied by optimal fiscal policy at these parameter values. These calculations use the following expressions:

$$R^* \equiv \frac{k_g}{k} = \left[ \left( \frac{A_0}{B} \right)^{\frac{\theta_2}{\gamma - \theta_2}} \left( \frac{a_1}{a_0} \right) \left( 1 - \tau^* \right)^{a_2} \right]^{a_2},$$  \hspace{1cm} (15)

$$\tau^* = a_1 + \phi,$$ \hspace{1cm} (16)

$$\mu^* \equiv \frac{y_{t+1} - y_t}{y_t} = A_1 \left[ \frac{\theta_2}{B^{\gamma}} \right]^{a_2} a_0 \left[ A_0 (1 - \tau^*) (R^*)^{a_3} \right]^{a_3} \theta_2 - 1,$$ \hspace{1cm} (17)

where

$$a_0 \equiv \frac{\beta \delta \theta_1}{1 - \beta (1 - \delta)},$$

$$a_1 \equiv \frac{\beta \delta \theta_3}{1 - \beta (1 - \delta_g)},$$

$$a_2 \equiv \frac{\gamma - \theta_2}{\delta_g (\gamma - \theta_2) - \theta_3 \gamma (\delta_g - \delta)},$$

which are derived using the techniques outlined in Cassou and Lansing (1998).12 For all countries except Norway, the 1970 public capital ratio is below the optimal ratio, implying that any subsequent decline in $k_g$ will move the economy further from optimality. The wide range of values for $R^*$ and $\tau^*$ show that a country’s optimal fiscal policy is quite sensitive to changes in parameter values—some of which may be subject to much uncertainty.13 By comparing the calibrated growth rate in the top panel of Table 2 to the optimal policy growth rate $\mu^*$, we see that deviations from the optimal spending and tax policy can have a significant impact on growth (and also welfare).14

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12 We assume that the policymaker views nonproductive public expenditures $g_t$ as exogenous.
13 A similar point was made in our earlier paper. See Figures 1 and 2 in Cassou and Lansing (1998).
14 This issue is pursued further in Cassou and Lansing (1999) with respect to the design of fundamental tax reforms.
Table 2: Calibration Information

<table>
<thead>
<tr>
<th>Calibration Targets</th>
<th>US</th>
<th>CAN</th>
<th>AUS</th>
<th>BEL</th>
<th>FIN</th>
<th>GER</th>
<th>NOR</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>($\frac{k_{gt}}{y_t}$)$_{1970}$</td>
<td>0.567</td>
<td>0.300</td>
<td>0.351</td>
<td>0.372</td>
<td>0.401</td>
<td>0.180</td>
<td>0.300</td>
<td>0.079</td>
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<td>($\tau_t$)$_{1970}$</td>
<td>0.321</td>
<td>0.313</td>
<td>0.242</td>
<td>0.357</td>
<td>0.325</td>
<td>0.329</td>
<td>0.393</td>
<td>0.369</td>
</tr>
<tr>
<td>($\frac{z}{y}$)$_{1970}$</td>
<td>1.102</td>
<td>1.150</td>
<td>1.387</td>
<td>1.032</td>
<td>1.482</td>
<td>0.300</td>
<td>2.197</td>
<td>1.112</td>
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<tr>
<td>($\frac{\delta}{y}$)$_{1970}$</td>
<td>0.102</td>
<td>0.123</td>
<td>0.173</td>
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<td>0.174</td>
<td>0.139</td>
<td>0.171</td>
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<tr>
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<td>0.300</td>
<td>0.300</td>
<td>0.300</td>
<td>0.300</td>
<td>0.300</td>
<td>0.300</td>
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<td>After-Tax Interest Rate</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
</tr>
<tr>
<td>Productivity Growth Rate</td>
<td>2.04%</td>
<td>1.93%</td>
<td>2.27%</td>
<td>3.58%</td>
<td>4.42%</td>
<td>4.32%</td>
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Parameter Values

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<tr>
<th></th>
<th>$\phi$</th>
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<th>0.287</th>
<th>0.201</th>
<th>0.329</th>
<th>0.287</th>
<th>0.312</th>
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<tr>
<td>$\alpha$</td>
<td>0.033</td>
<td>0.026</td>
<td>0.041</td>
<td>0.028</td>
<td>0.038</td>
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<td>$\gamma$</td>
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<td>1.600</td>
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<tr>
<td>$\theta_1$</td>
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<td>0.266</td>
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<td>0.244</td>
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<td>$\delta$</td>
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<td>0.100</td>
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<tr>
<td>$\delta_g$</td>
<td>0.081</td>
<td>0.086</td>
<td>0.084</td>
<td>0.083</td>
<td>0.078</td>
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<td>0.095</td>
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<td>$B$</td>
<td>1.586</td>
<td>1.436</td>
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<td>1.604</td>
<td>1.173</td>
<td>1.516</td>
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<tr>
<td>$A_0$</td>
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<td>1.595</td>
<td>2.328</td>
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<td>$A_1$</td>
<td>1.295</td>
<td>1.275</td>
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<tr>
<td>$\beta$</td>
<td>0.955</td>
<td>0.954</td>
<td>0.957</td>
<td>0.969</td>
<td>0.977</td>
<td>0.976</td>
<td>.969</td>
<td>0.961</td>
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Balanced Growth Properties of Optimal Fiscal Policy

<table>
<thead>
<tr>
<th></th>
<th>$R^*$</th>
<th>2.075</th>
<th>1.415</th>
<th>0.380</th>
<th>1.645</th>
<th>0.679</th>
<th>1.209</th>
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<tbody>
<tr>
<td>$\tau^*$</td>
<td>0.400</td>
<td>0.398</td>
<td>0.245</td>
<td>0.441</td>
<td>0.349</td>
<td>0.414</td>
<td>0.370</td>
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<tr>
<td>$\mu^*$</td>
<td>3.81%</td>
<td>4.11%</td>
<td>2.29%</td>
<td>5.11%</td>
<td>4.52%</td>
<td>6.28%</td>
<td>3.88%</td>
<td>6.00%</td>
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</tr>
</tbody>
</table>

5 Simulation Results

Starting from a balanced growth condition in 1970, we conduct four simulations for each country. Results are summarized in Table 3. The first simulation provides a baseline by holding the public capital ratio $\frac{k_{gt}}{k_t}$ and the tax rate $\tau_t$ constant at the 1970 levels shown in Table 2. The second simulation isolates the effect of the observed public capital policy. Specifically, we hold the tax rate constant at its 1970 level and construct an exogenous series for public investment $i_{gt}$ such that the model’s resulting time path for $\frac{k_{gt}}{k_t}$ coincides exactly with the post-1970 trend for each country.\footnote{Nonproductive expenditures are given by $g_t = \tau_{1970}y_t - i_{gt}$. Since $g_t$ is determined as a residual, the ratio $\frac{g_t}{y_t}$ is no longer constant.} We assume that households react optimally according
to the decision rules (8)-(10). The third simulation isolates the effect of the observed tax policy. We introduce an exogenous series of tax rates $\tau_t$ that coincides exactly with the post-1970 average tax rate trend for each country. We then construct an exogenous series for public investment $i_{gt}$ such that the resulting time path for $\frac{k_{gt}}{k_t}$ remains constant at its 1970 level.\textsuperscript{16}

The fourth simulation introduces the observed public capital and tax policies simultaneously, following the same basic algorithm.\textsuperscript{17}

<table>
<thead>
<tr>
<th>Experiment</th>
<th>US</th>
<th>CAN</th>
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<tr>
<td>Model w/ 1970 Public Capital and Tax Policy</td>
<td>2.04%</td>
<td>1.93%</td>
<td>2.27%</td>
<td>3.58%</td>
<td>4.42%</td>
<td>4.32%</td>
<td>3.62%</td>
<td>2.72%</td>
</tr>
<tr>
<td>Model w/ Post-1970 Public Capital Policy</td>
<td>1.46%</td>
<td>1.44%</td>
<td>2.09%</td>
<td>3.40%</td>
<td>4.48%</td>
<td>4.43%</td>
<td>3.71%</td>
<td>3.29%</td>
</tr>
<tr>
<td>Model w/ Post-1970 Tax Policy</td>
<td>1.83%</td>
<td>1.64%</td>
<td>1.49%</td>
<td>1.71%</td>
<td>2.96%</td>
<td>3.47%</td>
<td>2.07%</td>
<td>2.98%</td>
</tr>
<tr>
<td>Model w/ Post-1970 Public Capital and Tax Policy</td>
<td>1.25%</td>
<td>1.15%</td>
<td>1.31%</td>
<td>1.55%</td>
<td>3.00%</td>
<td>3.58%</td>
<td>1.97%</td>
<td>3.64%</td>
</tr>
<tr>
<td>Actual Post-1970 Growth Rate</td>
<td>0.63%</td>
<td>1.13%</td>
<td>1.52%</td>
<td>2.30%</td>
<td>2.62%</td>
<td>2.13%</td>
<td>2.23%</td>
<td>1.87%</td>
</tr>
</tbody>
</table>

In countries where the observed public capital ratio declines in the years following 1970 (U.S., Canada, Australia, and Belgium), the second simulation does in fact yield a slowdown relative to the first simulation. The simulated slowdowns are much less severe than the actual slowdowns, however (see the bottom of row of Table 3). In the case of the U.S., the simulated slowdown is somewhat larger in terms of percentage points than the corresponding experiment in Cassou and Lansing (1998, Table 2). This is due to the alternative calibration strategy used here which yields $\theta_3 = 0.178$ versus $\theta_3 = 0.123$ in our earlier paper. In countries where the post-1970 public capital ratio is increasing (Finland and Norway) or nearly constant (Germany and U.K.) the observed policy not only fails to produce a slowdown but actually causes productivity growth to increase. This is possible because policy variables are not set initially to maximize growth.\textsuperscript{18}

\textsuperscript{16}Once again, $g_t$ is determined as a residual and households are assumed to react optimally.

\textsuperscript{17}In most cases, the number of periods per simulation corresponds to the length of the sample period shown in the bottom half of Table 1. The second and fourth simulations for the U.K. and Norway are slightly shorter in length due to the availability of data on $\frac{k_{gt}}{k_t}$. This does not affect the basic nature of our results.

\textsuperscript{18}In Cassou and Lansing (1997) we compare growth- and welfare-maximizing policies in a model similar to this one but without public capital.
The third simulation focuses on rising tax rates as a possible explanation for the slowdowns. While a rising tax rate may bring the economy closer to $\tau^*$, the additional revenue is spent mostly on nonproductive goods and services $g_t$. By construction, no progress is made toward the optimal public capital ratio $R^*$. Table 3 shows that the observed tax policies lead to productivity slowdowns in all countries except the U.K. For Australia and Belgium, the tax-induced slowdowns are more severe than the public capital-induced slowdowns. This situation is reversed for the U.S. and Canada. Our earlier paper found that the tax-induced slowdown was more severe for the U.S. The reason for this difference is that here we start all simulations in 1970 versus 1947 in our earlier paper. As a result, the current simulation misses the crucial interval of sharply increasing average tax rates in the mid- to late-1960s that can be seen in Figure 2. This illustrates the sensitivity of quantitative results to the assumed starting date of the slowdown (see footnote 5). The model’s tax-induced slowdowns for Australia, Belgium, and Norway are large enough to account for the historically observed slowdowns. As detailed in our earlier paper, a number of model features influence the growth effects of distortionary taxes. One of the more important features is the elasticity of household labor supply. A less-elastic labor supply (larger $\gamma$) would diminish the explanatory power of rising tax rates to account for the slowdowns.

The fourth simulation shows that in most cases (U.S., Canada, Australia, Belgium, Finland, and Norway) combining a country’s observed public capital policy with its observed tax policy does a better job of accounting for the slowdown than either policy in isolation.

6 Conclusion

This paper used a simple endogenous growth model to investigate the degree to which observed public capital and tax policies can account for post-1970 productivity slowdowns in eight OECD countries. We found that observed public capital policies do not provide a convincing explanation for the slowdowns, although they may have been a contributing factor, together with a general trend of rising average tax rates needed to finance expanding public sectors in the OECD.
References


