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**EVIDENCE ON THE RELATION BETWEEN PUBLIC
CAPITAL AND GOVERNMENT EFFICIENCY**

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Evidence on the Relation between public capital and Government Efficiency.

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Abstract

This paper intends to contribute to the literature by providing empirical evidence on the relation between public capital stock and government efficiency. We present some objective indicators fo government efficiency and explore the mentioned relation. we find a positive and significant relation between both variables that survives the introduction of controls and robustness cheking

1 Introduction

Economists have long been preoccupied with the efficiency of public institutions and in particular with the efficiency in which governments render their services. The high quality of the public institutions should be able to guarantee the good functioning of democracies. Only under good operating public institutions we can assure that policies have a good and long effect on income [45]. There are however several questions that have not yet been answered in a consensual way concerning this topic: What exactly is meant by "government efficiency"? Why are some governments efficient while others are not? Can politicians determine some policy choices that affect the quality of government?

First things come first: what is government quality?. In [26], good government stands for "good-for-capitalistic development". The authors define a set of proprieties that a good government should have: a good government protects property rights, intervenes little and taxes lightly; it has a small dimension and a well- functioning bureaucracy free of corruption; it is politically free and sustained by a democracy; it provides public goods of high quality and, finally, it is efficient.

Not all these features are consensual among the literature [24], and so we will reduce the scope of the definition and consider that: a good government is a government that provides services, in essential sectors like health and education, in an efficient way, i.e., where the relation between output indicators and the amount of resources necessary to achieve them is high. Then, to measure it we must compare government output in a given sector with the amount of resources/money necessary to provide that quantity of output¹. Health and education are two of the most important sectors of government provision [41]. According to the World Development Indicators, average health expenditure (public and private) in the nineties was around 5,5% of GDP in the United States and the United Kingdom, almost 7% in Belgium, Canada, Denmark, Norway or Switzerland and above 7% in Germany,

¹Virtually any specific service can be provided and financed by the state and/or the private sector, so government efficiency needs to take into account the source of the financing. Moreover it could be argued that the distribution of financing between the state and privates could interfere in efficiency. Statistically this distribution turned out irrelevant.

France and Sweden. In what concerns education, the data is as striking. In USA and UK more than 5% of GDP was spent in education; in Canada and Finland this number rises to almost 7% and in Denmark, Norway or Sweden it goes way beyond 7%. In addition, in these two sectors there are ample quantifiable measures of output as well as information on sectorial public spending.

Lets now turn to the determinants of quality. In [26] those determinants are grouped in three categories: Economic, Political and Cultural. In [24] these determinants are explored in an empirical way and the case is made for most of them. In this paper we intend to look at a specific determinant of government efficiency: public investment in public capital. The literature on public capital is considerable but it does not explore in a thorough way its linkages with government performance. There is evidence that there is some relation between public capital and economic growth [39]; that public capital has some boosting effect on productivity [28]; and a wide literature on the linkage between public capital and output (see for example [20]). However it has not yet been established with accuracy the transmission mechanism that guide these relations. In paper [24] the argument is made for a direct relation between government quality and public capital (more precisely public investment in public capital), and it is also stated that there is a positive contribution of government efficiency to output and growth.

This paper intends to contribute to the literature by providing some empirical evidence of this relation. The paper is structured as follows: in section 2 we will present the data and the indicators that assess government quality. In section 3 we will try and explore the relation between government quality and public capital . Finally in section 4 we conclude.

2 Data

2.1 Definitions and Sources

The data used to construct the efficiency indicators presented below was taken from the World Development Indicators 2000.

2.2 Dependent Variables

In this paper we will use the measures of government performance built in [24]:

- 1)
$$\frac{100 - \text{infant mortality rate}}{\text{public health expenditures as a \% of GDP}}$$
- 2)
$$\frac{100 - \text{drop out rate}}{\text{public education expenditures as a \% of GDP}}$$
- 3)
$$\frac{100 - \text{illiteracy rate}}{\text{public education expenditures as a \% of GDP}}$$

The choice of Education is due to the fact of this sector being one of the fundamental sectors in any society. We use two measures of output (Drop out rate and illiteracy rate). We decided to confirm our results testing also a measure from the health sector (infant mortality)². Our main focus is the efficiency in the use of government resources, which means that more than being concerned with the output we are interested in its relation with the amount of resources spent to deliver it. For that purpose we do not use output per se but ratios of each of the output variables to public spending in the corresponding sector.

2.3 Regression Results

In [25] a model of endogenous growth with government quality is presented. In that model the government has to decide whether is going to spend its resources in investment in public capital or in a consumption good. Government quality is presented as being produced through a production function that has as single input per capita: public capital. The idea is that if governments want to achieve a certain level of quality they have to invest. Quality depends on an input that has to be accumulated, it demands an effort from

²As we referred previously this are the two sectors that consume consistently a bigger cut from government budget.

the state whereas physical goods (the consumption goods) does not demand such an effort. On the government side of the economy we have:

$$\begin{aligned} H_t &= \theta \tau y_t \\ \dot{k}_{gt} + \delta k_{gt} &= (1 - \theta) \tau y_t \\ q_t &= \left(\frac{k_{gt}}{L_t} \right)^\psi \end{aligned}$$

q_t stand for government quality and it depends on per capita public capital $\frac{k_{gt}}{L_t}$. H_t is a public consumption good and the amount of money spent to deliver it is a percentage (θ) of public revenue (τy). We want to confirm if the relation between quality and public capital is supported by empirical evidence. Using OLS regressions we will estimate the following relation:

$$\ln q_t = \psi \ln \left(\frac{k_{gt}}{L_t} \right) + \mu_t$$

Where μ_t represents the usual white noise variable.

We used as quality indicators the measures presented in the previous section and also the measures used in [26] to see if the results hold. The data on public capital was taken from [19]. The data used to construct the quality indicators was taken from World Development Indicators data set 2004. We used five year averages ranging from 1970 to 2000 in a total of 22 countries³. In table 9 we can see the results concerning the direct relation between quality measures and per capita public capital and also a broader specification where we considered as control variables the ones that performed consistently better in the previous section.

³We try to use the complete panel but the most we got was 224 observations which is considerably small. We also tried pooled data without averaging but we believe that we were losing much information about the diversity between countries.

<i>Table9</i>	<i>logirpse</i>	<i>logdorpse</i>	<i>logmrihepu</i>
$n - R^2$	24 - 0.064	59 - 0.044	44 - 0.151
<i>logKgpc</i>	-0.2224 (-1.53)	0.09949 (1.85) ^b	0.03552 (3.36) ^a
$n - R^2$	23 - 0.9017	59 - 0.1703	43 - 0.3744
<i>logKgpc</i>	1.3601 (8.43) ^a	0.4679 (2.63) ^b	0.1197 (3.77) ^a
<i>loggdppc</i>	0.7467 (9.10) ^a	0.2559 (2.18) ^b	0.0376 (1.86) ^c
<i>ge</i>	0.0025 (0.45)	-0.0046 (-0.31)	0.0039 (1.16)

Knowing that an increase in any of our quality measures means that we are better off we can see that, with exception of *logirpse* (where the relation is non significant) we have a positive and significant relation between government efficiency and per capita public capital. This relation survives the inclusion of the control variables. In the case of *logirpse* the inclusion of control variables makes the relation between government efficiency and public capital significant and positive. Note that there is an extremely high correlation between *loggdppc* and *logKgpc*. This implies that including this control variable will bring multicolinearity to the model. This alone can justify the difference in estimates when control variables are introduced.

To see if the relation between government quality and public capital was, in fact, robust we also tried different measures of quality⁴. In table 10 we can see that the results are basically the same.

<i>Table10</i>	<i>loglo</i>	<i>logCorrup</i>	<i>logBureau</i>	<i>logPR</i>
$n - R^2$	88 - 0.7695	88 - 0.7682	88 - 0.7710	126 - 0.1553
<i>logKgpc</i>	0.4371 (12.34) ^a	0.4191 (11.98) ^a	0.4115 (12.53) ^a	0.0443 (8.32) ^a
$n - R^2$	86 - 0.9957	86 - 0.9914	86 - 0.9850	106 - 0.4032
<i>logKgpc</i>	0.0051 (0.61)	0.0244 (2.86) ^a	0.0236 (2.0) ^b	-0.0483 (-2.38) ^b
<i>loggdppc</i>	0.1739 (34.99) ^a	0.1554 (27.50) ^a	0.1623 (23.99) ^a	0.0236 (2.43) ^b
<i>ge</i>	0.00004 (0.04)	0.0057 (3.52) ^a	0.0024 (1.32)	-0.0068 (-2.72) ^a

⁴More precisely the ones used by the authors in [26]. We have already seen that these measures capture a different reality and that they are different in nature.

The basic regression (without the controls) tell us that the bigger the stock of public capital is the bigger will the dependent variable be. Not that with exception of PR an increase in all the other indexes means an improvement in government quality. The results also survive the introduction of the control variables. Although the significance drops we can see that in three of the four cases public capital is still relevant in explaining government quality (in the case of PR the estimate has now the right sign).

3 Conclusion

Throughout the literature we find several links between public capital and other economic variables, namely growth. The mechanisms through which these links are established are frequently not clear. We believe that those mechanisms are related with government efficiency. More precisely we believe that the choices of government about the percentage invested in public capital are directly related to government quality, which in turn allows for higher and more consistent growth.

We did find an interesting and significant relation between the stock of public capital and the government efficiency. This relation survived the introduction of control variables and was valid whether we considered our measures of efficiency whether we used more subjective and qualitative measures of performance.

The measures of government efficiency presented are objective and easily quantifiable and capture a different reality from the measures used so far (mainly qualitative measures). In the present economic and social scenario, we have developed countries with limited budgets and extremely vulnerable to economic cycles. It is harder to come up with more inflows and government expenditures are difficult to restrain. We have governments that cannot expand and that have an urgent need in gaining efficiency. Knowing what's behind such efficiency can be determinant for a government in a developed country in a rapidly changing world.

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Appendix A - Definitions and Sources