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INSTITUTIONS AND THE IMPACT OF GOVERNMENT SPENDING ON GROWTH

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This paper reports the results of a study of the impact of government expenditures on economic growth, emphasizing how government effectiveness influences the efficiency of government spending. The effects of sub-categories of government spending on growth are also examined. Total expenditures are estimated to have negative growth effects for some groupings of developed nations. Consumption expenditures are found to have a detrimental growth effect in developing nations with ineffective governments. Developing nations with ineffective governments benefit from capital expenditures. To stimulate growth, developing nations should limit their governments' consumption spending and invest in infrastructure.

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Key words: economic growth, institutional quality, government expenditures

I. Introduction

Institutions matter. Empirical investigations into the determinants of economic growth have clearly established that good governmental institutions foster growth.¹ These effective governments establish a framework that promotes and rewards initiative and creativity in private enterprise. Countries with effective governments

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¹ A few selected studies include Olson (1982), North (1990), Hall and Jones (1999), Acemoglu, Johnson and Robinson (2005), Butkiewicz and Yanikkaya (2007), Keefer and Knack (2007) and Rodrik (2008).

may also make public spending decisions that support and foster economic development. The finding that the quality of governance is important for growth is emphasized by Reinhart and Rogoff (2009, p. 30):

...the modern literature on empirical growth increasingly points to “soft” factors such as institutions, corruption, and governance as far more important than differences in the ratios of capital to labor in explaining cross-country differences in per capita incomes.

In times of high unemployment, increased government spending is often advocated to stimulate aggregate spending. But within the same macroeconomic framework, the long-run growth path of the economy is assumed to depend upon resources, technology, and the factors listed above, and not on the level of government spending. Whether or not government expenditures are an effective means of providing short-run stimulus, their long-run growth effects are equally if not more important. Countries anxious to develop need to know which types of expenditures, if any, promote growth, and which have no impact or retard growth. If certain expenditures reduce growth, policy makers in developing and developed nations should understand these costs of government spending programs.

The impact of government spending on growth has been investigated extensively, generally with conflicting results. This holds true for total spending, the division between capital and consumption expenditures, and various components of government spending. The effects of government spending are also often found to differ between developed and developing nations.

Public spending may yield diminishing returns, just like other types of expenditures. Consider the case of road construction that may generate large, positive economic effects in a developing nation. In a developed nation a new road may have a very small marginal product. Road construction in a developed country may be providing relief of congestion or anticipating future congestion, rather than capital deepening. This “constant returns to scale” investment likely has no discernable aggregate empirical growth effect, since the investment maintains the existing ratio of public to private capital. Also, capital expenditures may be “pork barrel” expenditures; roads to nowhere. Good governmental institutions are more likely to constrain “pork barrel” expenditures. Weak governments may thrive on such spending. Thus, a category of government expenditure such as road construction may have very different impacts on economic growth dependent upon a government’s effectiveness.

Keefer and Knack (2007) demonstrate that the level of public expenditure may be inversely related to its productivity due to the quality of government. Limited

governments may spend less on public investment, but that investment may be productive. Weak and corrupt governments may have a high level of expenditures that is unproductive. Thus, the level of public investment may be a poor proxy for its productivity.

It is this last issue that is a primary focus of this study. How does controlling for government quality affect the measured productivity of various types of government expenditure? Also, are the effects different in developing and developed nations?

This paper reports the results of a study investigating the growth impact of government spending. The primary focus of the analysis is how government effectiveness affects the growth impact of government spending. Instead of classifying government expenditures as productive and unproductive *a priori*, this study divides countries into two groups as having effective or ineffective governments based upon three recognized measures of government effectiveness used in the empirical growth literature.² The main hypothesis examined is whether countries benefit from the various components of public expenditures differently because efficient governments make more productive expenditures. A number of different measures of government spending are used. Countries are grouped by both income level and by government effectiveness.

Several important results are found to be significant and consistent across specifications. The first is that government consumption expenditures (or current expenditures) have negative growth effects for certain country groupings. In particular, the negative growth effects of government consumption expenditures are clearly supported for developing nations with ineffective governments, while these expenditures generally have insignificant effects in developing nations with effective governments. A second result is that capital expenditures have positive growth effects in developing nations with ineffective governments, and possibly also in all developing nations. Combined, these two results indicate that government effectiveness is an important determinant of the growth impact of government spending for developing nations.

For developed nations, the evidence is mixed. Depending upon the definition of government effectiveness, both total expenditures and government consumption spending have significant negative growth effects for some classifications. No evidence supporting positive growth effects is found. Capital expenditures have a positive, significant growth effect in only one of six cases.

² Kneller, Bleaney, and Gemmill (1999) and Bleaney, Gemmill, and Kneller (2001) use *a priori* classifications of government expenditures in their analyses.

The next section of the paper reviews key findings in the literature about government spending and growth. The model and data are discussed in section III. The fourth section presents the empirical results. Section V presents concluding observations and policy recommendations.

II. Literature review

Many empirical studies of the determinants of growth include a measure of government spending. Initial cross-section studies by Grier and Tullock (1989) and Barro (1991) find a significant negative impact of government consumption expenditures on growth. Grier and Tullock also report that the estimated effect of government size on growth differs between different groups of countries, and estimate separate regressions for various country groups.

Subsequent studies report divergent findings. Hansson and Henrekson (1994) find that for 14 OECD countries, government consumption spending, transfers and total spending have a negative effect, education expenditures have a positive effect, and investment has no significant effect. Easterly and Rebelo (1993) report a significant, positive impact for government investment in transportation and communication, but no effect on growth for other fiscal measures.

Agell, Lindh and Ohlsson (1997) find that the growth impacts of the spending share in OECD countries are not empirically robust, varying from negative to positive depending upon the econometric specification. Folster and Henrekson (1999) reply that the econometric issues raised by Agell et al. are resolved through the use of panel data and lagged instruments and using this approach they find negative effects of government expenditures on growth. Agell et al. (1999) reply that the Folster-Henrekson results are flawed because their approach uses incorrect instruments and fails to address the issue of multi-directional causality, and that when growth regressions are correctly estimated, the growth effects of the public sector are ambiguous.

Schaltegger and Torgler (2006) find that at the state (canton) and local level within Switzerland, government spending from operating budgets has a negative growth effect but government capital spending has no effect on growth. In related work, Aschauer (1989) finds that public investment in “core infrastructure” has a significant positive effect on total factor productivity in the United States for the period 1949-1985.³

³ Aschauer (1989, p. 193) defines public investment in “core infrastructure” to include expenditures for streets and highways, airports, electrical and gas facilities, mass transit and water and sewer systems.

Devarajan, Swaroop and Zou (1996) find that for 43 developing countries, only current government expenditures have a positive growth effect. Expenditures for infrastructure, health and education have insignificant or negative effects. They interpret these findings as indicating that developing nations spend too much on capital and not enough on current expenditures. They also conjecture that some capital expenditures may not contribute positively to private sector productivity, suggesting the need to investigate in some way the quality of government expenditures. For the same two decades (1970–1990) as Devarajan, Swaroop and Zou, but using a smaller sample of 30 developing countries, Bose, Haque and Osborn (2007) find that government investment and education expenditures are growth enhancing.

Turnovsky and Fisher (1995) develop a theoretical model to examine the effects of government infrastructure and consumption expenditures. They find that infrastructure expenditures are likely more productive than consumption expenditures, but cannot rule out the possibility that consumption expenditures may be more productive under certain conditions.

Tanzi and Zee (1997) survey the literature and find conflicting empirical results for the impact of fiscal measures on growth. They identify several important econometric issues. The *a priori* division of expenditures into non-productive consumption and productive investment may not be appropriate. The relationship between growth and expenditures may be non-linear. Also, they, as have other authors, emphasize Wagner's Law that growth may result in demand for more government services, implying multi-directional causality between fiscal measures and growth.

Expanding the findings of Grier and Tullock, other studies investigate whether the growth effects of government spending vary between groups of countries. Folster and Henrekson (2001) argue that the composition of government spending varies significantly between high and low income countries, and that the growth retarding effects of government expenditures and/or consumption occur only after a government attains a certain threshold size. They report estimates for panels varying between 22 and 23 OECD countries supporting the proposition that a large government sector lowers growth in high income countries.

III. Model, data and estimation technique

The primary focus of this study is the relationship between government quality and the impact of fiscal expenditures on long-run growth. How does controlling for government quality affect the measured productivity of different categories of

government expenditure? The issue is examined in the context of recognizing that the effects of government spending may differ between developed and developing countries, using alternative measures of government quality.

An empirical growth model commonly used in the literature is employed to analyze the effects of government expenditures on growth. The model has the general form:

$$\gamma_{yt} = F(y_t, X_t, Z_t),$$

where γ_{yt} is a country's real per capita growth rate in period t , y_t is initial GDP per capita, X_t is a vector of conditioning variables that have been found to be key determinants of growth, and the variable Z_t represents a vector of variables related to government expenditure.

Data for the growth of real GDP per capita are from the World Bank (2007) and initial GDP data are from Heston, Summers and Aten (2002). The conditioning variables in the vector X_t are those commonly used in the literature. Human capital is measured as the lagged logarithm of life expectancy. Telephone mainlines per thousand workers is the measure of the capital stock.⁴ The lagged fertility rate measures population growth, and is expected to have a negative effect since the population growth rate reduces growth in the neoclassical growth model. The sum of imports and exports as a percentage of GDP measures openness, a variable frequently found to increase growth. All four of these variables are taken from the World Bank (2007).

The Kaufmann, Kraay and Mastruzzi (2007) index of the rule of law controls for institutional quality. The rule of law variable is an index ranging from -2.5 (worst) to 2.5 (best). Also included in the estimates are dummy variables for three geographic regions: Sub-Saharan Africa, Latin America and East Asia.⁵

Government expenditure data for the period 1970 -1999 are from Easterly and Sewadeh (2002). The major revision in the IMF's data compilation (2001) makes the data for the 1970-1998 period not comparable with the new series beginning in 1990. The new government expenditure data for 1990-2004 are from the World

⁴ Easterly and Levine (1997) use this variable as a measure of infrastructure. This variable is widely available for a large number of countries on an annual basis. While telephone mainlines and gross domestic investment are positively correlated the former variable is a stock variable, while gross investment is a flow and is subject to endogeneity concerns.

⁵ The rule of law and geographic variables are the same for all time periods.

Bank (2007). For the two differing expenditure measures, two sets of estimates are reported: one for the 1970-1999 period and a second set for the 1990-2004 period.⁶

To determine the effects of government expenditures on growth, a variety of expenditure measures are used. These include total expenditures as a percentage of GDP, government consumption as a percentage of GDP, and various sub-categories of expenditures as discussed below, all as a percentage of GDP.

Mean values of the data are reported in Table 1. Developing nations have lower average growth rates than developed nations, and developing nations with ineffective governments have lower average growth rates than those with effective governments. Focusing only on developing nations, those with effective governments have higher rates of gross capital formation and lower fertility rates, both of which increase growth. Developing nations with effective governments have higher rates of government consumption and current expenditure, but do not have higher rates of government capital expenditure, except when effectiveness is determined by having a legal system of British origin.

For each of the two government finance data sets, panels are created by averaging the data over five-year periods. For the earlier sample, there are six five-year periods, beginning with 1970-1974 and following sequentially. For the newer data series, there are three five-year periods. The first is 1990-1994 and others follow sequentially.

Over 100 developed and developing nations are included in the data set.⁷ The sample size for each estimated equation is determined by data availability. Seemingly-Unrelated Regression (SUR) is the technique used to estimate the basic model. While the constant term for each five-year period varies, coefficients for other variables are constrained to have the same value for all periods. Barro and Lee (2005) recommend SUR estimates because fixed-effect and first-differenced GMM estimates eliminate time-persistent cross-section information.⁸ Results of robustness checks are also reported.

⁶ Since revenue growth typically follows expenditure growth, we do not include revenue measures. Also, limited data on revenue would require a large reduction in sample size.

⁷ A list of countries is available from the authors upon request.

⁸ Fixed-effect estimates also obtain very large convergence coefficients.

Table 1. Mean values of data

Variables	Summary Statistics				Government Effectiveness				British Legal System				Ethnicity Index			
	Developed Countries	Developing Countries	Developing Countries	Developing Countries	Effective Developing Countries	Ineffective Developing Countries	Effective Developing Countries	Ineffective Developing Countries	Effective Developing Countries	Ineffective Developing Countries	Effective Developing Countries	Ineffective Developing Countries	Effective Developing Countries	Ineffective Developing Countries		
Averages 1970-2004																
GDP per capita growth rates (%)	2.47	1.56	3.00	1.38	2.04	1.51	2.39	1.22								
Initial GDP per capita (log)	4.19	3.39	3.69	3.28	3.33	3.37	3.46	3.30								
Fertility Rates(log, lagged)	0.29	0.68	0.59	0.73	0.69	0.71	0.64	0.74								
Life expectancy rates (log, lagged)	1.87	1.75	1.80	1.72	1.74	1.74	1.77	1.71								
Gross fixed capital formation (% of GDP)	23.21	21.37	23.52	20.04	21.69	20.27	22.44	19.43								
Log (Telephone Mainlines per thousand)	2.54	1.18	1.80	1.02	1.25	1.14	1.43	1.00								
Rule of Law (-2.5+2.5)	1.36	-0.42	0.36	-0.61	-0.21	-0.53	-0.20	-0.57								
Trade (% of GDP)	89.00	69.44	77.63	62.98	80.70	57.34	71.09	61.76								
Government Consumption (% of GDP)	18.47	15.04	15.57	14.33	15.85	13.83	15.10	13.94								
Averages 1970-1998																
Total Government Expenditure (% of GDP)	35.07	25.39	25.27	25.44	28.97	23.78	26.05	24.91								
Defense Expenditure (% of GDP)	3.56	2.72	2.02	2.99	2.47	2.74	2.41	2.85								
Education Expenditure (% of GDP)	3.35	3.53	3.87	3.39	3.93	3.33	3.75	3.35								
Health Expenditure (% of GDP)	3.01	1.53	1.78	1.43	1.83	1.41	1.74	1.40								
Social Security & Welfare Expenditure (% of GDP)	10.79	2.52	4.20	1.76	1.67	2.85	3.70	1.73								
Transportation & Communication Expenditure (% of GDP)	1.83	1.92	1.81	1.97	2.59	1.66	1.98	1.90								
Interest Payments (% of GDP)	3.29	2.56	2.48	2.60	3.30	2.22	2.43	2.64								
Current Expenditure (% of GDP)	31.53	19.27	20.32	18.85	22.48	17.84	20.46	18.42								
Capital Expenditure (% of GDP)	3.42	6.19	5.10	6.63	7.22	5.77	5.63	6.57								

Note: See text for sources and definitions.

IV. Results

A. Basic results

The baseline models are estimated for all countries and by country income level for two sample periods: 1970-1999 using the original government expenditures data, and 1990-2004 using the new government expenditures data.⁹ The baseline specifications include the following determinants of growth of real GDP per capita: the natural logarithm of the initial level of real GDP per capita for convergence; the log of the lagged value of life expectancy for human capital; the lagged log of the fertility rate for population growth; the log of current telephone mainlines per 1000 workers for the physical capital stock; the current value of the sum of imports and exports as a percentage of GDP for trade openness; the rule of law index for institutional quality; and dummies for Latin America, East Asia, and Sub-Saharan Africa; and various government expenditures as a percentage of GDP.

The first estimates, reported in Table 2, are for the impact of total government expenditures on growth. For the first sample period, 1970-1999, government expenditures have a significant, negative effect on growth for the total sample and in developed countries. In the second sample, 1990-2004, government expenditures have a significant, negative effect on growth for the complete sample and for developing countries.

The results for government consumption expenditures, reported in Table 3 are consistent. In both sample periods, consumption expenditures have a significant negative effect both for the complete sample and for developing countries, but not for developed nations.

The “rule of law” measure is significant for all countries and developing countries. Rule of law is a measure of government effectiveness, and the estimates obtain a significant positive growth effect for developing countries that establish and maintain the rule of law.

As the basic models obtain divergent results, more focused estimates may provide greater insight into the effects of government consumption expenditures on growth. A worthwhile approach is to analyze whether government effectiveness matters for the growth impacts of government (consumption) expenditures. It is expected/assumed

⁹ For the interval 1995-1999 in the first sample, government expenditures data are averages for the years 1995-1998, the last four years of the old government expenditures data. All other data for that interval are five-year averages.

Table 2. Effects of government expenditures on growth (GDP per capita growth rates)

Independent variables	1970-1999 6 five-year periods			1990-2004 3 five-year periods		
	All Countries	Developing Countries	Developed Countries	All Countries	Developing Countries	Developed Countries
Log (Initial GDP per capita)	-3.81*** (4.02)	-3.72*** (3.08)	-7.88*** (4.53)	-3.74*** (2.96)	-0.86 (0.60)	-3.37 (1.05)
Log (Life Expectancy, lagged)	10.67** (2.24)	8.00 (1.40)	-4.12 (0.25)	3.67 (0.56)	-4.21 (0.61)	-3.50 (0.07)
Log (Fertility Rates, lagged)	-2.57* (1.79)	-6.13*** (3.06)	-3.42*** (2.52)	-3.35* (1.85)	-3.99* (1.87)	2.06 (0.60)
Log (Telephone Mainlines per thousand)	1.16** (1.94)	1.50** (2.13)	-1.29 (0.94)	1.39* (1.73)	0.23 (0.27)	-8.16 (1.59)
Rule of Law	-0.04 (0.14)	0.31 (0.80)	0.31 (0.83)	0.59 (1.60)	1.71*** (3.68)	1.22 (1.56)
Trade (% of GDP)	0.018*** (4.52)	0.015*** (2.66)	0.014*** (5.23)	0.008** (2.19)	0.006 (1.10)	0.006 (1.41)
Total Expenditure (% of GDP)	-0.023* (1.70)	-0.019 (1.06)	-0.047*** (3.64)	-0.05*** (2.46)	-0.05** (2.12)	-0.04 (1.10)
Sub Saharan African Dummy	-1.25*** (2.53)	-1.42*** (2.48)	-	-0.65 (1.02)	-1.58** (2.31)	-
Latin American Dummy	-1.04*** (2.56)	-1.83*** (3.62)	-	-0.69 (1.32)	-1.15** (2.22)	-
East Asian Dummy	0.89* (1.73)	0.24 (0.33)	0.06 (0.13)	0.36 (0.62)	-0.39 (0.54)	-0.44 (0.41)
For each equation, R ² (min-max)	.12-.40	.09-.55	.27-.54	.18-.30	.19-.46	.03-.35
(N)	426	290	136	196	144	52

For each specification, estimation is done with the SUR method. The system has 3 or 6 equations, where the dependent variables are the per capita growth rate over five-year periods. Each equation has a different constant term (not reported here). Other coefficients are restricted to be the same for all periods. t-statistics are in parentheses. *** Significant at the 1 percent-level. ** Significant at the 5 percent-level. * Significant at the 10 percent-level.

Table 3. Effects of government consumption expenditures on growth (GDP per capita growth rates)

Independent variables	1970-1999 6 five-year periods			1990-2004 3 five-year periods		
	All Countries	Developing Countries	Developed Countries	All Countries	Developing Countries	Developed Countries
Log (Initial GDP per capita)	-4.06*** (5.25)	-3.08*** (3.49)	-6.80*** (4.48)	-3.20*** (3.68)	-1.75* (1.86)	-0.56 (0.30)
Log (Life Expectancy, lagged)	9.06*** (2.55)	4.82 (1.25)	-8.38 (0.54)	-0.73 (0.18)	-5.13 (1.22)	-12.51 (0.46)
Log (Fertility Rates, lagged)	-2.79** (2.20)	-5.20*** (3.21)	-1.60 (1.03)	-2.08 (1.37)	-4.53*** (2.52)	3.41* (1.85)
Log (Telephone Mainlines per thousand)	0.42 (0.82)	0.56 (0.96)	-1.23 (1.01)	0.69 (1.14)	0.13 (0.19)	-6.64*** (2.61)
Rule of Law	0.71*** (2.54)	1.08*** (3.25)	0.51 (0.53)	1.09*** (3.70)	1.79*** (5.10)	0.57 (1.28)
Trade (% of GDP)	0.018*** (5.60)	0.019*** (4.10)	0.009*** (4.36)	0.007** (2.26)	0.006 (1.22)	0.008*** (3.53)
Government Consumption (% of GDP)	-0.07*** (3.28)	-0.098*** (3.61)	-0.026 (1.11)	-0.09*** (3.07)	-0.08*** (2.46)	-0.06 (1.55)
Sub Saharan African Dummy	-1.20*** (2.66)	-1.24*** (2.50)	-	-1.15** (2.17)	-1.52*** (2.72)	-
Latin American Dummy	-0.88** (2.18)	-1.66*** (3.32)	-0.99 (1.25)	-0.38 (0.88)	-1.07*** (2.21)	-2.05*** (2.49)
East Asian Dummy	0.39 (0.88)	0.36 (0.58)	-0.20 (0.65)	0.83* (1.68)	0.66 (1.03)	-0.46 (1.03)
For each equation, R ² (min~max)	-.07~.38	-.04~.49	.11~.58	.07~.33	.12~.4	.03~.53
(N)	647	484	163	368	281	87

For each specification, estimation is done with the SUR method. The system has 3 or 6 equations, where the dependent variables are the per capita growth rate over five-year periods. Each equation has a different constant term (not reported here). Other coefficients are restricted to be the same for all periods. t-statistics are in parentheses. *** Significant at the 1 percent-level. ** Significant at the 5 percent-level. * Significant at the 10 percent-level.

that effective governments spend in ways that promote growth or at least do not inhibit growth. There are many studies in the literature reporting that countries with certain characteristics are more likely to have more effective governments. It is evident that countries, depending on their effectiveness levels, may choose different expenditure patterns, and are more likely to be affected differently from government expenditures. The next set of estimates is for nations classified according to the effectiveness of their governments.¹⁰

Government effectiveness is classified using three alternative criteria. Using the Kaufmann, Kraay and Mastruzzi (2007) index of government effectiveness, countries with an index above the mean value are included in the effective government group, while those with an index value below the mean are classified as ineffective.¹¹ The second classification criterion is whether a country's legal system is of British origin. La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999) show that the government efficiency factor is high in English common law countries and these countries are less interventionist compared to other countries.

The third criterion is ethnic homogeneity. Countries with an ethnically homogeneous population are presumed to have an effective government, while those with an ethnicity index above the mean value (ethnic diversity) are presumed to have ineffective governments. La Porta et al. show that higher ethnic fractionalization is associated with more interventionism (worse protection of property rights, more intrusive government regulation, and higher tax rates) and lower government efficiency (lower scores on bureaucratic delays and tax compliance, but not on corruption). They conclude that ethnically homogenous and common law countries have better/ more effective governments.

The number of developing countries classified as either effective or ineffective varies by the criterion used. There are a total of 105 countries using the index of government effectiveness and 104 using either of the other criteria. A total of 36 countries have ineffective governments by all three effectiveness measures and only 4 are effective in all three classifications. However, 31 countries have effective

¹⁰ Hine (2008) reports that parameter estimates in growth regressions may be sensitive to changes in the sample, so investigating possible parameter heterogeneity for different country groups is a worthwhile endeavor.

¹¹ Government effectiveness is defined by Kaufmann et al. (2007) as capturing perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.

governments by at least two of the criteria. The number of governments classified as effective is 20 by the index of effectiveness, 37 having a legal system with British origins, and 43 using ethnicity as the classification criterion.

The number of developed countries actually classified by each effectiveness measure varies. The number of developed countries included in the sample is 34, 36, and 37 using the ethnic fractionalization index, British law origin, and the index of government effectiveness, respectively. A total of 5 countries have ineffective governments by all three effectiveness measures and only 4 are effective in all three classifications. However, 12 countries have effective governments by at least two of the criteria. The number of governments classified as effective is 20 by the index of effectiveness, 14 having a legal system with British origins, and 14 using ethnicity as the classification criterion. Given the diversity of country classifications using these alternative measures of effectiveness, obtaining consistent results across all three measures is a strong finding.

The results in Table 4 support the hypothesis that government effectiveness matters in developing nations. For the earlier time period the estimates indicate a negative effect of government expenditures on growth in developing nations with effective governments and a negative impact of consumption expenditures on growth for the various classifications of ineffective governments in developing nations, and no significant effect of consumption expenditures on growth for countries classified as having effective governments. The estimated coefficients for the effect of government consumption are remarkably similar. A 1% increase in government consumption relative to GDP reduces the annual growth rate by approximately 0.10%.

For the later sample (1990-2004) the results obtained have a similar pattern of a negative, significant effect of government consumption on growth in developing nations with ineffective governments. For the estimates of a significant negative effect, the estimated coefficients are also -0.10 or greater in absolute value.¹² This is the most consistent result obtained, both in terms of the magnitude of the growth effect and statistical significance.

¹² Rice and Stewart (2008) have developed an index of weak states for developing countries. Dividing developing countries at the mean of the index and estimating the models for effective (above mean) and ineffective (below mean) governments obtains results very similar to the other measures of effective and ineffective governments, especially for the earlier sample. The estimated growth impact of government consumption expenditures in ineffective (below mean) states for 1970-1999 is -0.093 and statistically significant at the 10% level. This result is comparable to the estimated results for other measures of ineffective governments during the same sample period.

Table 4. Government effectiveness and the effects of government spending on growth (GDP per capita growth rates)

Independent variable	Government Effectiveness		British Legal Origin		Ethnicity	
	Effective Government	Ineffective Government	Effective Government	Ineffective Government	Effective Government	Ineffective Government
Developing Nations 1970 - 1999						
Total Expenditure (% of GDP)	-0.19*** (5.06)	-0.005 (0.24)	-0.086*** (3.36)	0.004 (0.17)	-0.074*** (2.24)	-0.017 (0.72)
Government Consumption (% of GDP)	-0.078 (1.04)	-0.11*** (3.89)	-0.06 (1.30)	-0.12*** (3.84)	-0.07 (1.25)	-0.14*** (4.22)
Developed Nations 1970 - 1999						
Total Expenditure (% of GDP)	-0.05*** (3.98)	-0.04 (1.38)	-0.02 (2.00)	-0.01 (0.84)	-0.03*** (3.84)	-0.09*** (4.07)
Government Consumption (% of GDP)	-0.07*** (3.03)	-0.06** (2.63)	-0.12*** (3.66)	-0.001 (0.05)	-0.002 (0.10)	-0.07 (1.15)
Developing Nations 1990 - 2004						
Total Expenditure (% of GDP)	0.01 (0.20)	-0.07** (2.19)	-0.038 (0.99)	-0.57* (1.90)	-0.073* (1.91)	-0.045 (1.26)
Government Consumption (% of GDP)	-0.10 (1.26)	-0.10*** (2.86)	0.0002 (0.00)	-0.11*** (2.61)	-0.088 (1.38)	-0.15*** (3.48)
Developed Nations 1990 - 2004						
Total Expenditure (% of GDP)	-0.05* (1.94)	-0.49 (0.51)	-0.18*** (6.21)	0.04 (0.70)	-0.12 (1.22)	-0.05 (0.68)
Government Consumption (% of GDP)	-0.05 (1.18)	0.05 (0.28)	-0.16 (1.38)	0.03 (0.64)	-0.05 (0.75)	-0.13* (2.01)

For each specification, estimation is done with the SUR method. The system has 3 or 6 equations, where the dependent variables are the per capita growth rate over five-year periods. Each equation has a different constant term (not reported here). Other coefficients are restricted to be the same for all periods. t-statistics are in parentheses. *** Significant at the 1 percent-level. ** Significant at the 5 percent-level. * Significant at the 10 percent-level.

In this later sample period, significant, negative effects of total expenditures in developing nations are found for two measures of ineffective government and one measure of effective government. In terms of the level of significance and consistency, this finding is not as strong as that for government consumption spending.

For developed nations, half of the twelve estimated coefficients are negative and significant; three each for total expenditure and consumption spending. For both spending categories, significant effects are found for two classifications of effective governments.

In the later sample the estimates for developed nations do not obtain a consistent pattern of results. Total expenditures have a significant negative effect for two measures of government effectiveness and consumption expenditures are significantly negative for one category of ineffective government. These results for developed nations for the earlier sample are stronger in terms of consistency and the level of significance.

It is often asserted that government investment to develop infrastructure is productive while current expenditures are nonproductive. Estimates using these two categories of expenditures for the 1970-1999 period are reported in Table 5.¹³ One consistent result is that capital expenditures in developing nations with ineffective governments are productive. Every 1% of GDP spent on capital expenditures increases annual real growth by slightly more than 0.1%. One possible explanation for this result is that, as indicated in Table 1, capital formation rates (gross fixed capital formation) are lower in developing countries with ineffective governments.¹⁴ Thus, government capital expenditure may be a substitute for private capital formation.

The estimated growth effect of current expenditures in developing nations is negative and significant regardless of government effectiveness. The magnitude of the growth effect ranges from -0.06% annual growth reduction to -0.23% annual growth reduction for each 1% of GDP spent on current government expenditure. While this range is wide, most of the estimates suggest a growth reduction of slightly less than -0.1% for each 1% of GDP devoted to current government expenditures.

For developed nations for the first sample period, current expenditures significantly reduce growth for two classifications of effective government. The growth impact for developed nations is smaller, 0.05% or less for each 1% of GDP of current

¹³ The breakdown of current and capital expenditures is available only for the earlier sample period.

¹⁴ Ineffective governments may reduce the incentive to invest in these countries.

Table 5. Growth effects of government current and capital expenditures (GDP per capita growth rates)

Independent variable	Government Effectiveness		British Legal Origin		Ethnicity	
	Effective Government	Ineffective Government	Effective Government	Ineffective Government	Effective Government	Ineffective Government
Developing Nations 1970 – 1999						
Current Expenditure (% of GDP)	-0.23*** (5.98)	-0.06** (2.26)	-0.13*** (3.42)	-0.074*** (2.48)	-0.087** (2.21)	-0.089*** (3.23)
Capital Expenditure (% of GDP)	0.11 (0.86)	0.11*** (2.50)	-0.18** (2.43)	0.15*** (3.24)	-0.07 (0.85)	0.12*** (2.61)
Developed Nations 1970 – 1999						
Current Expenditure (% of GDP)	-0.05*** (3.92)	-0.05 (2.12)	-0.025 (1.72)	-0.012 (0.91)	-0.031*** (4.18)	-0.09 (4.06)
Capital Expenditure (% of GDP)	-0.10 (0.86)	0.20 (1.37)	-0.14 (0.73)	0.08 (0.70)	0.19*** (5.65)	-0.20 (1.24)

For each specification, estimation is done with the SUR method. The system has 3 or 6 equations, where the dependent variables are the per capita growth rate over five-year periods. Each equation has a different constant term (not reported here). Other coefficients are restricted to be the same for all periods. t-statistics are in parentheses. *** Significant at the 1 percent-level. ** Significant at the 5 percent-level. * Significant at the 10 percent-level.

government expenditures. In one case capital expenditures significantly increase growth by approximately 0.2% for each 1% of GDP expended on government capital.

This pattern of results indicates that government expenditures affect growth more in developing nations than in developed nations. Current expenditures reduce growth in developing nations regardless of government effectiveness, while capital expenditures increase growth in developing nations with ineffective governments. While not directly tested, one explanation for these findings is that taxation to generate the revenue needed to finance current expenditures reduces incentives in developing nations, and, as discussed above, investment by ineffective governments in developing nations may substitute for private investment.

Estimates were obtained for other categories of government spending.¹⁵ One consistent pattern in the earlier sample is that interest payments have a significant, negative growth effect of -0.1 or more for five of six classifications of developed countries.¹⁶ Only developed countries with a legal system of British origin were not adversely affected by interest payments.¹⁷

Another result for the same sample period is that growth in developed countries with effective governments was decreased by social security and welfare systems. The magnitude of the estimated effects ranges from -0.1 to -0.4. Of course, social security systems reduce the need for retirement savings and generous welfare systems reduce the need for precautionary savings in case of job loss. Reduced saving reduces investment. In the neoclassical growth model the long-run result of reduced investment has only a level effect, but it can have a steady-state growth rate effect in endogenous growth models.

Some instances of a significant negative growth effect of education spending were estimated, although many of these were for classifications of nations with ineffective governments. It is feasible that education expenditures in nations with ineffective governments are less successful in developing human capital.

¹⁵ A separate regression is estimated where each spending category replaces government expenditures.

¹⁶ Results discussed in this and the following paragraphs are not reported but are available from the authors.

¹⁷ This group includes Australia, Canada, (the Republic of) Ireland, New Zealand, the United Kingdom and the United States; countries that have continuously had AAA or AA credit ratings reflecting relatively strong fiscal positions.

B. Robustness checks

Agell, Lindh and Ohlsson (1997) find that growth effects of government tax and expenditure shares are sensitive to changes in control variables.¹⁸ Specifically, they find that the inclusion of a measure of demographic structure, the percentage of non-working age population, changes the estimated growth effects from negative and significant to positive and significant. Table 6 reports the estimates when this demographic structure variable replaces the fertility rate in the basic growth regression. The results are comparable to those reported in Tables 2 and 3 for the 1970-1999 periods. For both government expenditures and government consumption, the new estimates are virtually identical to the original estimates, both in magnitude and significance.

The basic models were estimated using annual panel data for the earlier sample period, for all countries, developing countries and developed countries.¹⁹ Four different expenditure measures were used: total expenditures, government consumption expenditures, current expenditures and capital expenditures. For nine of the twelve cases significant negative effects are found. Only for capital expenditures are the results insignificant.²⁰

The results reported here may be due to reverse causation. Wagner's Law states that growth may increase the demand for government services, resulting in expansion of the public sector. Agell et al. (1999) demonstrate that one-period lagged values of explanatory variables are not appropriate instruments. Lack of a sufficient number of appropriate instruments makes instrumental variable estimates problematic. As an alternative Granger causality tests are conducted for growth and various measures of government spending. Granger causality tests fail to find significant effects of growth on measures of government expenditures except for government consumption. Of course, Wagner's Law suggests a positive relationship between growth and

¹⁸ A limitation of the Agell et al. critique is that their analysis is not conducted within the context of a fully-specified empirical growth model. Their particular results may be due to an omitted variables problem.

¹⁹ Results are available from the authors. The short sample makes estimation problematic for the second period.

²⁰ For developing nations for the earlier sample, interacting the three measures of government effectiveness with the four measures of expenditures (total, consumption, current and capital) obtains significant interaction terms that are in line with the results reported above. A test of normality obtains a Jarque-Bera statistic of 7015 with a p value of 0.0000, clearly a failure of normality. However, in a large sample it is possible to get a significant Jarque-Bera statistic due to outliers even if the distribution of residuals is not far from normal.

consumption, while the estimates reported above indicate government consumption has a negative growth effect. In several instances, government expenditure measures have a significant causal effect on growth, including total expenditures, current expenditures and capital expenditures in the first sample period.²¹

V. Discussion and conclusions

In the neoclassical model, growth depends solely on resource (labor) growth and technology. Growth is not affected by policy choices. Endogenous growth models allow for policy and other variables to affect long run growth.

In particular, fiscal policy may have important growth affects. The taxes levied to finance expenditures distort incentives and create tax wedges. Public expenditures may substitute for or crowd out private spending. Public expenditures and subsidies may also affect resource allocation, either positively or negatively, or in both directions for different activities. Public expenditures for capital and education are investments that may stimulate growth. Thus, government expenditures have uncertain growth effects that must be investigated empirically.

This paper reports the results of an investigation of the growth effects of government expenditures, with emphasis on the role that government effectiveness has in determining the growth effects of government spending. The results reported above indicate that total government expenditures have a small negative growth effect in developed countries. However, the results are inconsistent across sample periods and classification by government effectiveness, except for interest payments and for social security and welfare spending. High levels of interest payments are the result of past government dissaving and social security and welfare programs reduce the incentive to save. In an endogenous growth model, reduced saving reduces investment and can reduce growth.

Estimated results are more consistent and of greater magnitude for developing nations. Each 1% of government consumption expenditure reduces growth by 0.1% in developing nations with ineffective governments. This result is consistent across sample periods and classifications of government effectiveness. Total expenditures are estimated to reduce growth in developing nations, especially in those with effective governments. This result is consistent across classifications in the first period, but not consistent in the second period. Developing nations with ineffective governments benefit from increased public capital expenditures.

²¹ Detailed results are available upon request from the authors.

The strongest, most consistent results are obtained for consumption and capital expenditures. For the earlier sample period, negative growth effects of consumption expenditures are found for developed and developing nations. For developing nations, the results appear stronger in those nations with ineffective governments. Negative growth effects for government consumption are also estimated for developing nations with ineffective governments for the recent sample period. The other consistent result is that capital expenditures have significant positive growth effects for developing countries with ineffective governments in the first sample period.

These results indicate the importance of fiscal policies for developing nations. Expenditures appear to reduce growth, and government consumption expenditures reduce growth in countries with ineffective governments. However, these same countries would benefit from increased public investment. A possible explanation is that ineffective governments in developing nations discourage private investment, so public investment may be a substitute for private investment. Thus developing nations that are most in need of strong growth must carefully allocate public expenditures to minimize negative and maximize beneficial growth effects.

Aid agencies should insure that aid designations are not undermined by the fungibility of money. Aid intended for capital projects may facilitate diversion of other funds to current expenditures. The benefits of increased capital spending in developing nations may be offset by increases in current expenditures using funds freed by foreign aid, especially in developing nations with ineffective governments.

References

- Acemoglu, Daron, Simon Johnson, and James A. Robinson (2005), Institutions as a fundamental cause of long-run growth, in P. Aghion and S. Durlauf, *Handbook of economic growth*, Amsterdam, Elsevier.
- Agell, Jonas, Thomas Lindh, and Henry Ohlsson (1997), Growth and the public sector: A critical review essay, *European Journal of Political Economy* **13**: 33-52.
- Agell, Jonas, Thomas Lindh, and Henry Ohlsson (1999), Growth and the public sector: A reply, *European Journal of Political Economy* **15**: 359-366.
- Aschauer, David A. (1989), Is public expenditure productive? *Journal of Monetary Economics* **23**: 177-200.
- Barro, Robert J. (1991), Economic growth in a cross section of countries, *Quarterly Journal of Economics* **106**: 407-443.
- Barro, Robert J. and Jong-Wha Lee (2005), IMF programs: Who is chosen and what are the effects? *Journal of Monetary Economics* **52**: 1245-1269.
- Bleaney, Michael, Norman Gemmell, and Richard Kneller (2001), Testing the endogenous growth model: Public expenditure, taxation, and growth over the long run, *Canadian Journal of Economics* **34**: 36-57.

- Bose, Niloy, Emranul Haque, and Denise R. Osborn (2007), Public expenditure and economic growth: A disaggregated analysis for developing countries, *Manchester School* **75**: 533-556.
- Butkiewicz, James L. and Halit Yanikkaya (2007), Time-consistent politics and growth in developing countries: An empirical analysis, *Review of World Economics* **143**: 306-323.
- Devarajan, Shantayanan, Vinaya Swaroop, and Heng-fu Zou (1996), The composition of public expenditure and economic growth, *Journal of Monetary Economics* **37**: 313-344.
- Easterly, William, and Ross Levine (1997), Africa's growth tragedy: Policies and ethnic divisions, *Quarterly Journal of Economics* **112**: 1203-1250.
- Easterly, William and Sergio Rebelo (1993), Fiscal policy and economic growth: An empirical investigation, *Journal of Monetary Economics* **32**: 417-458.
- Easterly, William, and Mirvat Sewadeh (2002), Global development network growth database, Macro time series, World Bank, Data Set.
- Folster, Stefan, and Magnus Henrekson (1999), Growth and the public sector: A critique of the critics, *European Journal of Political Economy* **15**: 337-358.
- Folster, Stefan, and Magnus Henrekson (2001), Growth effects of government expenditure and taxation in rich countries, *European Economic Review* **45**: 1501-1520.
- Grier, Kevin B. and Gordon Tullock (1989), An empirical analysis of cross-section economic growth, 1951-1980, *Journal of Monetary Economics* **24**: 259-276.
- Hall, Robert E., and Charles I. Jones (1999), Why do some countries produce so much more output per worker than others? *Quarterly Journal of Economics* **114**: 83-116.
- Hansson, Par, and Magnus Henrekson (1994), A new framework for testing the effect of government spending on growth and productivity, *Public Choice* **81**: 381-401.
- Heston, Alan, Robert Summers, and Bettina Aten (2002), *Penn World Tables version 6.1*, Philadelphia, Center for International Comparisons at the University of Pennsylvania.
- Hineline, David R. (2008), Parameter heterogeneity in growth regressions, *Economics Letters* **101**: 126-129.
- International Monetary Fund (2001), *Government finance statistic manual 2001*, Washington, DC, International Monetary Fund.
- Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi (2007), Governance matters VI: Aggregate and individual governance indicators, 1996 – 2006, Policy Research Working Paper Series 42-80, World Bank.
- Keefer, Philip and Stephen Knack (2007), Boondoggles, rent-seeking, and political checks and balances: Public investment under unaccountable governments, *Review of Economics and Statistics* **89**: 566-572.
- Kneller, Richard, Michael Bleaney, and Norman Gemmell (1999), Fiscal policy and growth: Evidence from OECD countries, *Journal of Public Economics* **74**: 171-190.
- La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny (1999), The quality of government, *Journal of Law, Economics, and Organization* **15**: 222-79.
- North, Douglass C. (1990), *Institutions, institutional change and economic performance*, New York: Cambridge University Press.
- Olson, Mancur C. (1982), *The rise and decline of nations: Economic growth, stagflation and social rigidities*, New Haven, CT, Yale University Press.
- Reinhart, Carmen M., and Kenneth S. Rogoff (2009), *This time is different: Eight centuries of financial follies*, Princeton: Princeton University Press.
- Rice, Susan E., and Stewart Patrick (2008), *Index of state weakness in the developing world*, Washington, DC: The Brookings Institution.
- Rodrik, Dani (2008), Second-best institutions, *American Economic Review* **98**: 100-104.

- Schaltegger, Christoph A., and Benno Torgler (2006), Growth effects of public expenditure on the state and local level: Evidence from a sample of rich governments, *Applied Economics* **38**: 1181-1192.
- Tanzi, Vito and Howell H. Zee (1997), Fiscal policy and long-run growth, *IMF Staff Papers* **44**: 179-209.
- Turnovsky, Stephen J., and Walter H. Fisher (1995), The composition of government expenditures and its consequences for macroeconomic performance, *Journal of Economic Dynamics and Control* **19**:747-786.
- World Bank (2007), *World development indicators*, CD-ROM.

