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**EMPIRICAL DETERMINANTS OF GOVERNMENT  
EFFICIENCY - EXPLORING THE DATA**

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# Empirical Determinants of Government Efficiency - Exploring the Data

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## Abstract

This paper is concerned with two things: finding an objective and easily quantifiable measure of government efficiency and testing possible determinants of such quality. As measures of government efficiency we use the ratios of infant mortality rate to health expenditures as a percentage of GDP and the ratios of drop out and illiteracy rates to education expenditures as a percentage of GDP. We assume that government efficiency in providing health and education services depends on economic, political and cultural factors.

**JEL:** A, C<sub>1</sub>, O<sub>43</sub>

**Keywords:** Government Efficiency, OLS regression, Government output

# 1 Introduction

Now a days there is a consensus that efficient governments can make a difference to a country's economic performance. The high quality of the public institutions (and more generally of governments) is viewed as necessary to assure that policies have a positive and lasting effect on income[1]. Taking for granted the importance of good government other questions naturally arise: how can government efficiency be measured? Why do some countries have better government than others? If we can trace the determinants of government efficiency, hoe can we manipulate them to boost quality and enhance growth? In other words can policy choices affect the quality of government?

Before beginning to answer these questions it is essential to define what government quality is. In [2], good government stands for "good-for-capitalistic development". In this paper we use the term good government to stand for 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 it is high. Health and education are two of the most important sectors of government provision [4].

We will test as determinants of quality several variables similar to the ones used in [2]. In the paper those determinants are grouped in three categories: Economic<sup>1</sup>, Political<sup>2</sup> and Cultural<sup>3</sup>. We will have a more extensive reading of each of these groups and hence include more variable in our study.

This paper intends to contribute to the literature by providing new and quantifiable measures of government efficiency as well as understanding the

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<sup>1</sup>In this category the main idea is that institutions are created whenever the benefits of their existence are greater than the costs os their creation. Wealth and development would make this trade-off between benefits and costs in favor of good governance, not only because development would make good institutions affordable but also because it would make them more reliable.

<sup>2</sup>In this second category, the basic assumption is that those in power will shape policies and institutions to allow them to remain in power and transfer resources toward themselves. Some groups and some societies allow rent seeking behavior in a more generalized way than others.

<sup>3</sup>The third group of determinants relies on the fact that societies have beliefs that induce collective actions and make certain kind of behaviors more probable. When these beliefs are strongly persistent they tend to be associated with culture. Religion can be seen as a proxy of cultural characteristics since it strongly influences the individual and social actions.

100-infant mortality rate	100-drop out rate	100-literacy rate
public health expenditures as a % GDP	public education expenditures as a % GDP	public education expenditures as a % G

Figure 1:

determinants of their variability across countries.

## 2 Data

### 2.1 Definitions and Sources

The analysis presented in this paper uses a set of variables covering up to 208 countries. The definition and sources of all the variables are summarized in Appendix A. We used a data set with five year averages (1970 to 1974; 1975 to 1980, etc.).<sup>4</sup>

### 2.2 Dependent Variables

We selected the following measures of government performance:

public health expenditures as a % GDP    public education expenditures as a % GDP  
public education expenditures as a % GDP

We defined the indicators in this manner so that the reading is consistent: if the numerator increases the ratio decreases and we are worse off. If the denominator increases (for the same numerator, i.e., for the same infant mortality ratio, for example) the measure decreases and, in fact, we are also worse off.

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<sup>4</sup>In most cases there were data missing in between 1970 and 200. We used the maximum number of observations available leading to averages with different number of years. The summary statistics for each variable are presented in appendix B.

## 2.3 Independent Variables

We consider the three mentioned groups of government quality determinants - economic, political and cultural. For each of these groups we selected variables that, according to the existing literature, are viewed as proxies. We were left with the following variables:

Table 1

Economic	Political	Cultural
GDP per capita	Corruption Index	Religious Fractionalization Index
Percentage of Urban Population	Political Freedom Index	Country's Main Religious Confession
Age Structure of Population	Bureaucracy Index	Country's Legal System
Sectorial Structure of Employment	Law and Order Index	
Trade	Ethnic Fractionalization Index	
Foreign Direct Investment	Gini index	
Government Expenditures		

GDP per capita stands for a country's wealth while the urban population, the age structure or the employment structure are used as proxies of the development level. Government expenditures are used to try and infer if there is, in fact, a relation between size and quality. The other two variables in this group account for the degree of openness.

To evaluate the relevance of political factors in determining government quality, we use indexes of corruption, political freedom, quality of the bureaucracy and law and order tradition<sup>5</sup>. As proxies of the level of social polarization and fractionalization we will use an index of ethnic fractionalization and the gini index to account for inequalities in income distribution.

The proxies of cultural factors are an index of religious fractionalization, dummy variables that account for the legal system (namely English, French, German, Scandinavian and Socialist) and still a dummy for each of the main religious confessions (Catholic, Protestant and Muslim).<sup>6</sup>

## 2.4 Regression Results

<sup>5</sup>We actually drop the corruption and the bureaucracy index due to the high correlation with the law and order index.

<sup>6</sup>The correlations between all the variables can be seen in appendix D.

We started by checking what our intuition, supported by the related literature, was telling us: wealth has a predominant effect on government performance.

Wealthier countries should have not only the means to provide better public services but also a greater demand for them. The Positive sign on the estimate associated with `loggdppc` (table 2) confirms this thesis.

Our second concern had to do with government size. Our question was: if a wealthier nation has better performing governments than shouldn't wealthier governments (or at least governments that spend more) be more efficient? In table 2 we can see that general expenditures are determinant to government performance. Not only they are significant at 1% but they do not weaken the importance of `loggdppc`. The results tell us that the higher the general expenditures are the more efficient a government should be. In the related literature the relation between government size and quality is ambiguous however our data points to a clear positive relation between them.

We then proceed to see if variables from the other groups (political and cultural) had any relevance in explaining differences in government performance around the world.

Following the literature, we expect that an increase in the number of different groups within a society or an excessive social polarization (wether we are talking about income groups or ethnic ones) will foster inefficiency. <sup>7</sup>

Both the `loggdppc` and `ge` survive the introduction of the gini index and of the ethnic fractionalization index. However the results concerning both this indexes are not consistent (table 3). Ethnic fractionalization is statistically relevant and has a negative effect on `mrihepu` (which means that an increase

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<sup>7</sup>In [16] the authors state that: "We find trust and civic norms are strong in nations with higher and more equal incomes, with institutions that restrain predatory actions of chief executives, and with better-educated and ethnically homogenous populations". So, equal incomes and ethnically homogeneous populations built up a trustful society that in turn enhances governance quality

The link between trust and homogeneity is also referred in [18]: "Trust is higher in more ethnically, socially and economically homogeneous societies and where legal and social mechanisms for constraining opportunism are better developed".

in the ethnic fractionalization leads to a decrease in government performance in the health department)

The second type of political variables has to do with distortions to the normal functioning of political institutions. Distortions to the normal functioning of political institutions should have a negative effect on government quality. If a well functioning government offers the "correct" amount of a given service using the proper amount of inputs, any interference in this relation will cause inefficiencies and hence lead to worse governing. These distortions have a negative impact on public spending in general and on public spending in particular<sup>8</sup>. This negative impact doesn't necessarily mean that there will be less public spending or investment, it can also mean that this investment will be less productive<sup>9</sup>. More commonly corruption and excessive bureaucracy will lead to less investment (public or private) and to the channeling of investment towards the interests of certain groups [26]. The relation between public and private sectors will also be damaged by the prevalence of distortions in the political process [25]. The absence of political or civic liberties themselves can also damage government efficiency<sup>10</sup>.

Because the correlation between the indicators (political freedom, corruption, bureaucracy and law and order) were so high we decided to use only two. In particular we chose the ones that had more data available. In table 4 we can see that the introduction of lo or pr does not interfere with the results concerning neither loggdppc nor ge. Both indexes have estimates with the expected sign. An increase in lo means an increase in law and order tradition which in turn leads to an increase in government performance. However this index is only statistically relevant in the first regression. An increase in pr means less political rights which in turn leads to less efficient governments. This index is relevant in two of the regressions presented.

Cultural traditions that favor trust and confidence, that protect the in-

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<sup>8</sup>As mentioned in [28]

<sup>9</sup>See [29]

<sup>10</sup>As noted by the authors of [30]: "Democracy may also influence the "quality of governance": rulers with discretionary power tend to set up distortionary policies that benefit a small set of insiders at the expense of the general population (...). The exercise of power is potentially more arbitrary in autocratic regimes that lack public scrutiny of policy makers".

dividual against the state and that limit the power of the governors<sup>11</sup> should improve government quality. According to [19] there is a negative association between trust and the dominance of a strong religion. Hence, religious fractionalization may lead to higher government quality if societies are able to overcome differences. A related issue as to do with the influence of a countries main confession in its government efficiency. Following [2] it is expected that Protestant countries have more efficient countries than Catholic or Muslim ones. The same argument is made in [11]. The results presented in table 5 allow us to conclude that religious fractionalization has, in fact, a positive effect on government efficiency. The case is more clear in the education sector. Now broadly speaking religious dummies seem to have no relevance in determining government performance (there are few but inconsistent exceptions).

We also tried a country's legal system as possible determinant of government efficiency (see [2]). We left out the English legal system and our results (table 6) are not conclusive.

In table 7 we can see the results concerning what we previously called social-economic variables.

We can see that in the cases where urban population is statistically relevant it has a positive effect on government efficiency. This means that rather than being a proxy for the level of underdevelopment, urban concentration makes it easier to provide good quality services.

The age structure of the population does not have a consistent effect on efficiency.

The employment structure tells us one interesting thing: the more agricultural oriented a society is the less efficient its governments will be. This can be explained on one hand considering that a concentration of employment in the agricultural sector means less development or, on the other, that it means less urban concentrations. The results concerning the percentage of employment in services has a rather strange result (when significant): it is not good for government efficiency to have high concentration of employment in the services sector. This might have to do with some increasing bureaucracy that emerges when we have to many people providing services.

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<sup>11</sup>[2]



Once again it should be emphasized that the introduction of these variables does not change the effect of  $\text{loggdpcc}$  nor  $\text{ge}$  in government efficiency.

At last in table 8 we can see the results concerning the degree of exposure to the exterior. The gross foreign direct investment has no particular relevance in explaining government efficiency however trade seems to have a positive effect on the indexes considered.

### 3 Conclusion

We used three different groups of possible determinants of Government Quality.

This groups followed very closely the literature being: economic determinants; political determinants and cultural determinants.

The second group has a somewhat different reading than the one found in paper [2] and that is due mainly to the way Quality is measured in the referred paper.

We conclude that the most consistent and robust determinants of government efficiency are:

Wealth - Richer countries have on average more efficient governments if income is distributed in an evenly fashion

Government Expenditures - The larger the amount spent by general governments the more efficient they will be. In [2] the authors conclude that better performing governments are also larger ones but do not conclude to the direction of this relation.

Notice that both these variables survived the test for endogeneity. Broadly speaking we found evidence that the existence of several groups in a society had some bearing in government performance but the results were not consistent with the variables used (sometimes income groups was the relevant factor others what matter was ethnic groups). Political rights or law and order tradition (one of the two) affects in a positive way government performance.

Cultural factors seem to have some importance mainly if we are talking religious fractionalization. In what dominant religion is concerned the conclusions were not consistent. The legal system tradition seems to be irrelevant in determining the variability in government decision around the world.

Urban population seems to have a positive contribution to government quality and the percentage of agricultural employment a negative impact.

We can conclude that all the three groups have some influence in explaining the variability we observe in government efficiency across countries. At least one variable of each group was relevant in determining changes in the quality indexes we constructed.

We believe that there is a considerable variability of Government quality around the world and that this variability is determined by differences in a country's economic, political and cultural factors. The new 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 . Defenitions and Sources

Name	Description	Soruce
Bureau	Index - quality of bureaocracy	Freedom House 2003
c	Dummy - 1 majority population catholic	[23]
Corr	Index - corruption	Freedom House 2003
Dor	drop out rate	[10]
ea	employment agriculture - % total employment	WDI 2000
ei	employment industry - % total employment	WDI 2000
es	employment services - % total employment	WDI 2000
fracethnic	Index - ethnic fractionalization	[2]
fraclang	Index - linguistic fractionalization	[2]
fracreg	Index - religious fractionalization	[2]
gdppc	gdp constant prices 1995 US\$, per capita	WDI 2000
ge	central government general expenditures, % gdp	WDI 2000
gfdi	gross foreign direct investment, % gdp	WDI 2000
Hepu	public health expenditures, % gdp	WDI 2000
ir	illiteracy rate, adult (above 15)	WDI 2000
lat	latitude	WDI 2000
lo	Index - law and order	Freedom House 2003
lse	Legal system, english	[23]
lsf	Legal system, french	[23]
lsg	Legal system, german	[23]
lss	legal system, socialist	[23]
lssc	Legal system, scandinavian	[23]
m	Dummy - 1 majority population muslim	[23]
majorit	Dummy - 1 Majoritarian electoral rule	[30]
mri	mortality rate infant	WDI 2000
p	Dummy - 1 majority population protestant	[23]
pop0	population ages 0-14, % total population	WDI 2000
pop15	population ages 15-64, % total population	WDI 2000
pop65	population ages 65 and more, % total population	WDI 2000
pr	Index - political rights	Freedom House 2003
pres	Dummy - 1 Political regime presidential	[30]
pse	public spending on education %gdp	WDI 2000
t	trade %gdp	WDI 2000
urban	urban population, % total population	WDI 2000

## Appendix B . Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ge	678	28.57481	15.26796	0	187.3722
ea	491	28.44898	26.68222	.1	94.4
es	494	46.30527	19.9573	3.95	87.4
t	899	75.90013	46.85494	2.106214	393.7483
gfdi	732	3.109424	5.966065	0	111.3019
lat	1194	.2839417	.1892732	.0111	.8
fracethn	1116	.4402156	.2587782	0	.930175
urban	1224	48.93547	24.59002	2.7022	100
gini	442	40.03798	12.24764	15.4	77.3
pop0	1078	35.96428	9.753376	14.60054	51.1643
pop65	1078	5.908061	3.937475	1.080114	17.87591
pr	951	4.391122	2.350539	1.1	7.7
lo	502	3.481026	1.575984	.5	6
majorit	384	.4375	.4967256	0	1
pres	384	.390625	.488527	0	1
fracreg	1224	.4393764	.2273039	.0022857	.8602599
lse	1194	.3366834	.4727736	0	1
lss	1194	.1708543	.3765393	0	1
lsf	1194	.4371859	.4962466	0	1
lsq	1194	.0301508	.1710737	0	1
lssc	1194	.0251256	.1565722	0	1
c	1194	.3165829	.4653381	0	1
p	1194	.1407035	.3478612	0	1
m	1194	.2211055	.4151653	0	1
loggdppc	923	7.577976	1.540908	4.554719	10.80753
irpse	588	17.15552	142.8423	.0308471	3450.794
dorpse	471	8.604562	12.02159	0	98.57054
mrihepu	334	27.74098	39.01859	.523446	278.1819



# Appendix C . Regression Results

Table 2<sup>12</sup>

	irpse				dorpse				mrihepu			
	Regression1		Regression2		Regression1		Regression2		Regression1		Regression2	
	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>
	560	11.1	418	28.22	459	22.13	380	28.56	328	42.53	231	47.01
	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.
Constant												
loggdppc	1.84 <sup>c</sup>	-0.5594	7.69 <sup>a</sup>	52.50268	10.91 <sup>a</sup>	63.49847	8.29 <sup>a</sup>	62.33876	13.22 <sup>a</sup>	-41.66377	9.60 <sup>a</sup>	-31.58269
ge		11.48625	4.62 <sup>a</sup>	4.46577		3.61903	4.91 <sup>a</sup>	3.016412		15.23214	3.04 <sup>a</sup>	12.46254
				0.17806				0.212425				0.406648

Table 3

	irpse				dorpse				mrihepu			
	Regression1		Regression2		Regression1		Regression2		Regression1		Regression2	
	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>
	217	42.23	413	28.57	220	33.51	380	28.67	149	43.8	227	49.78
	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.
Constant												
loggdppc	6.75 <sup>a</sup>	39.39147	6.26 <sup>a</sup>	54.63328	4.07 <sup>a</sup>	46.74347	5.87 <sup>a</sup>	60.59047	4.86 <sup>a</sup>	44.87723	8.55 <sup>a</sup>	-4.773118
ge	3.85 <sup>a</sup>	5.298376	4.60 <sup>a</sup>	4.33269	3.61 <sup>a</sup>	3.979868	4.79 <sup>a</sup>	3.145886	2.54 <sup>b</sup>	5.950746	2.91 <sup>b</sup>	10.84002
gini	1.90 <sup>c</sup>	0.2400634		0.1743101		0.2698968		0.213122		0.2592471		0.2977736
fracethn		0.1515699	-0.82	-2.496764	0.89	0.1307371	0.49	1.724462	-2.43 <sup>b</sup>	-0.354867	-4.15 <sup>a</sup>	-26.39742

Table 4

	irpse				dorpse				mrihepu			
	Regression1		Regression2		Regression1		Regression2		Regression1		Regression2	
	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>
	405	30.32	262	36.28	374	28.44	215	33.7	222	47.3	190	48.26
	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.
Constant												
loggdppc	6.48 <sup>a</sup>	58.35382	6.00 <sup>a</sup>	62.13669	5.64 <sup>a</sup>	64.87332	4.29 <sup>a</sup>	59.5502	6.98 <sup>a</sup>	-16.52437	6.71 <sup>a</sup>	-28.63463
ge	4.80 <sup>a</sup>	4.030884	3.92 <sup>a</sup>	2.812565	4.97 <sup>a</sup>	2.785337	4.31 <sup>a</sup>	3.078843	3.34 <sup>a</sup>	11.20125	2.51 <sup>b</sup>	11.85463
pr	-3.57 <sup>a</sup>	0.1795827		0.1197742		0.214123		0.1787851		0.4172686		0.3622814
lo		-0.868185	3.36 <sup>a</sup>	1.673571	-0.75	-0.220816	1.01	0.6335618	-1.83 <sup>c</sup>	-13486158	0.29	0.470484

Table 5

	irpse				dorpse				mrihepu			
	Regression1		Regression2		Regression1		Regression2		Regression1		Regression2	
	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>
	415	29.13	418	35.73	380	28.95	380	31.91	229	47.71	231	47.1
	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.
Constant												
loggdppc	7.60 <sup>a</sup>	49.76577	8.11 <sup>a</sup>	54.44565	8.34 <sup>a</sup>	61.03994	9.36 <sup>a</sup>	64.02884	9.58 <sup>a</sup>	-32.09113	9.27 <sup>a</sup>	-31.76453
ge	4.69 <sup>a</sup>	4.591771	5.73 <sup>a</sup>	4.257471	4.97 <sup>a</sup>	3.042734	4.40 <sup>a</sup>	3.188353	2.94 <sup>a</sup>	12.52454	3.09 <sup>a</sup>	12.41031
fracreg	2.33 <sup>b</sup>	0.1661647		0.2162923		0.2068389		0.1926522		0.3945207		0.4088214
c		5.043556	0.8	0.8433611	1.77 <sup>c</sup>	2.987444			0.11	0.688182		
m			0.92	1.246345			-4.58 <sup>a</sup>	-4.996401			0.48	1.750046
p			-4.82 <sup>a</sup>	-7.829834			-0.7	-0.67033			-0.19	-0.631193
							-1.23	-2.294294			0.02	0.1163624

Table 6

<sup>12</sup> a - significant at 1%; b - significant at 5%; c - significant at 10%

	irpse		dorpse		mrihepu	
	Regression1		Regression1		Regression1	
	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>
	418	30.8	380	29.62	231	57.35
	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.
Constant		52.71379		63.78866		-49.61415
loggdppc	7.92 <sup>a</sup>	4.37725	7.24 <sup>a</sup>	3.03924	10.04 <sup>a</sup>	14.9043
ge	4.13 <sup>a</sup>	0.1640009	4.50 <sup>a</sup>	0.2062664	2.19 <sup>b</sup>	0.2678176
lss	6.15 <sup>a</sup>	7.587531	0.28	0.7395012	6.32 <sup>a</sup>	24.0608
lsf	0.23	0.2959931	-2.12 <sup>b</sup>	-2.482199	-0.24	-0.857057
lsg	3.37 <sup>a</sup>	4.905761	-0.3	-0.33738	-3.04 <sup>a</sup>	-11.7022
lssc		dropped	-2.32 <sup>b</sup>	-1.932526	-5.08 <sup>a</sup>	-14.87474

Table 7

	irpse				dorpse				mrihepu			
	Regression1		Regression2		Regression1		Regression2		Regression1		Regression2	
	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>
	418	29.62	418	28.98	380	28.79	375	28.94	231	48.44	223	52.334
	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.
Constant		59.62523		53.58429		60.23254		66.34551		-21.4168		81.55463
loggdppc	3.46 <sup>a</sup>	2.783349	4.82 <sup>a</sup>	4.02854	7.51 <sup>a</sup>	3.549473	4.71 <sup>a</sup>	3.329085	5.39 <sup>a</sup>	9.20704	5.45 <sup>a</sup>	8.41625
ge	4.63 <sup>a</sup>	0.177197	4.42 <sup>a</sup>	0.1625907	4.95 <sup>a</sup>	0.2135738	4.66 <sup>a</sup>	0.2193035	3.02 <sup>a</sup>	0.4509967	4.09 <sup>a</sup>	0.6765661
Urban	2.87 <sup>b</sup>	0.1105326			-1.34	-0.046513			2.91 <sup>a</sup>	0.2545386		
pop0			0.09	0.0129486			-0.89	-0.113009			-5.84 <sup>a</sup>	-2.05931
pop65			1.29	0.407374			1.6	-0.42668			-4.41 <sup>a</sup>	-3.272017
	Regression3		Regression3		Regression3		Regression3					
	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>				
	221	40.17			191	55.92						
	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.				
Constant		85.97054				77.88328		89.81988				
loggdppc	2.46 <sup>b</sup>	1.602377			5.56 <sup>a</sup>	3.137539		3.59 <sup>a</sup>				
ge	3.98 <sup>a</sup>	0.1340466			4.41 <sup>a</sup>	0.146479		1.81 <sup>c</sup>				
ea	-2.61 <sup>a</sup>	-2.054264			-2.46 <sup>a</sup>	-0.143205		-6.51 <sup>a</sup>				
es	-0.86	-0.069742			-3.24 <sup>a</sup>	-0.224685		-5.32 <sup>a</sup>				

Table 8

	irpse		dorpse		mrihepu	
	Regression1		Regression1		Regression1	
	n	R <sup>2</sup>	n	R <sup>2</sup>	n	R <sup>2</sup>
	tobs	Coeff.	tobs	Coeff.	tobs	Coeff.
Constant		53.26944		59.97203		-44.13384
loggdppc	10.91 <sup>a</sup>	4.493673	7.84 <sup>a</sup>	3.109494	9.41 <sup>a</sup>	13.26506
ge	3.36 <sup>a</sup>	0.1220216	4.50 <sup>a</sup>	0.1860698	1.57	0.2436902
t	1.15	0.009575	2.79 <sup>a</sup>	0.0271512	2.71 <sup>a</sup>	0.1375234
gfdi	1.62 <sup>c</sup>	0.1655493	0.54	0.0759711	-0.26	-0.072537

## Appendix D . Correlations

	<i>pr</i>	<i>Corr</i>	<i>lo</i>	<i>Bureau</i>	<i>SIRPSE</i>	<i>SDORPSE</i>	<i>SMRIHEP</i>
<i>pr</i>	1						
<i>Corr</i>	-0.52	1					
<i>lo</i>	-0.49	0.7	1				
<i>Bureau</i>	-0.53	0.76	0.66	1			
<i>irpse</i>	-0.347515	-0.026098	-0.006285	-0.067858	1		
<i>dorpse</i>	-0.029184	-0.109149	0.0846609	0.0099926	0.6350399	1	
<i>mrihepu</i>	-0.251249	0.2521941	0.3980894	0.3984514	0.3726411	0.2615015	1