The Role of Institutions in Cross-Section Income and Panel Data Growth Models: A Deeper Investigation on the Weakness and Proliferation of Instruments

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Abstract

This paper investigates the role of institutions in determining per capita income levels and growth. It contributes to the empirical literature by using different variables as proxies for institutions and by developing a deeper analysis of the issues arising from the use of weak and too many instruments in per capita income and growth regressions. The cross-section estimation suggests that institutions seem to matter, regardless if they are the only explanatory variable or are combined with geographical and integration variables, although most models suffer from the issue of weak instruments. The results from the growth models provides some interesting results: there is mixed evidence on the role of institutions and such evidence is more likely to be associated with law and order and investment profile; government spending is an important policy variable; collapsing the number of instruments results in fewer significant coefficients for institutions.

Key-Words: Institutions; Income Levels and Growth: Cross-Section and Panel Data Analysis: Weak Instruments and Instrument Proliferation.

JEL Codes: C33, O47, O43

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Introduction

This paper empirically investigates the role of institutions on per capita income levels and growth for a set of developed and developing countries, using cross-section and panel data analysis. The empirical literature more often than not has either focused on cross-section income or used panel methods to analyse economic growth. One of the key contributions of our work is to develop both types of analysis. Another contribution is that we use both two stage least squares (2SLS) and optimal GMM (OGMM) for the cross-sectional analysis and for the panel data growth models we estimate the models by System and Difference GMM. The main empirical contribution of our paper is to provide a deeper understanding of the role of weak instruments and the consequences of instrument proliferation in the context of per capita income and growth equations.

In sum, our empirical estimates suggest that in a cross-sectional context institutions seem to matter regardless if they are included as the only explanatory variable or if they are included in models with geographical and integration variables. We also find that in most cases there are problems with weak instruments. The results from the growth models provide us with some important lessons: there is mixed evidence on the role of institutions and such evidence is more likely to be associated with law and order and investment profile; government spending is an important policy variable and fiscal discipline helps foster long-run growth; collapsing the number of instruments results in fewer significant coefficients for the institutions term.

The paper is organized in three sections other than this introduction and concluding remarks. The first section is devoted to summarizing the empirical and theoretical literature on economic growth and differences in per capita income levels for models with institutions and other control variables. Section two focuses on a discussion of the issues of weak and excessive instruments in the context of such models Section three reports the empirical results for both cross-section and panel data analysis.

I – Growth and Income Models: A Review of the Literature

The use of the quality of the institutional profile of a country as an explanatory variables in empirical studies on growth and per capita income levels has become increasingly popular and studies which incorporate this term find some empirical support for the role of the quality of institutions, although it is fair to say that there is not a consensus on what is called the *institution rule* hypothesis. Once the growth and per capita income models incorporate institutions as an explanatory variable, it is not clear if other factors - such as geography, trade integration and policy variables - have their effect on growth and differences in income levels indirectly. There has been significant empirical progress in the development of the literature on growth and differences on per capita income levels and much of this is due to new econometric techniques and the availability of longer databases, incorporating lessons from the endogenous growth and human capital models, and addressing the endogeneity of institutions with valid instruments.

The literature on growth and cross country income differences suggests the existence of a direct (positive) association with the quality of institutions, meaning that better institutions foster long run economic growth and countries with better institutions are the ones with higher per capita income levels. The idea that institutions matter for long-run growth and differences in income levels is related to the argument that institutions provide the rules of the game in a society and impose constraints that are important in shaping how humans interact with each other. In this sense, institutions are crucial in terms of having a significant impact on the structure of economic incentives in a society, where property rights are essential in providing adequate environment and incentives for individuals to invest in physical and human capital in a way that achieves a better and more efficient resource allocation and the use of new technology.

Empirical work, such as Sachs and Warner (1995), Frankel and Romer (1999) and, more recently, by Acemoglu et. al (2001, 2004), Easterly and Levine (2003), Sachs (2003) and Rodrik et. al (2004), focuses on the investigation of the contribution of geography, integration and institutions in explaining differences in per capita income levels. Additionally, these studies attempt to understand why some societies innovate and accumulate more than others so that they can experience higher growth rates and income levels in the long-run.

It is possible to split the empirical work in this area into three separate groups. The first is the *geography / endowment hypothesis* and it is associated with studies such as Sachs and Warner (1995, 1997), Bloom and Sachs (1998) and Sachs (2003). This hypothesis concerns the existence of a direct effect of tropics, germs, and crops on economic development. The second group of studies is called the *institutions hypothesis* and relates to the indirect effect of tropics, germs, and crops through institutions. One example of this hypothesis is Hall and Jones (1999) who use institutional quality as one component of social infrastructure, with instruments used such as distance from the equator and European language, and this is shown to be crucial in explaining differences in productivity. Acemoglu et.al (2001) provides another example of the institution view, using settler's mortality as an instrument for institutions. The third group of studies is represented by the *policy view*, which argues in favor of sound macroeconomic policies, openness to international trade, and the absence of capital account controls as important measures of fostering economic growth and increasing per capita income. According to this view, as represented by studies such as Frankel and Romer (1999), tropics, germs, and crops may have a positive impact on production, technology and institutions, but long-run economic development is more likely to rely on policies such as low inflation, increase in trade and financial integration to the world and fiscal discipline.[1]

Acemoglu et. al (2001) is considered a seminal paper in addressing the endogeneity problem of using proxies for institutions when examining and evaluating differences in economic performance among countries. The paper uses differences in mortality rates as an instrument to estimate the effect of institutions on economic growth and the 2SLS estimation results are shown to be robust to different specifications, indicating the occurrence of significant effects of institutions on per capita income.[2]

Hall and Jones (1999) focus on explaining why countries have such a huge difference in per capita income levels. The empirical findings suggest that differences in capital accumulation, productivity and ultimately in per capita income is due to differences in institutions and government policies. If that is the case, policy makers should focus on improving the quality of institutions and on adopting an adequate set of economic and social policies to improve economic growth and development over time. The authors developed the argument that long run economic performance is primarily determined by social infrastructure, which depends on differences in capital accumulation and productivity. The empirical analysis found evidence that there is a positive relation between per capita output and social infrastructure even when controlling for endogeneity of institutions and government policies.

The empirical literature has not been able to produce a consensus on the role played by geography in explaining differences in per capita income levels. For example, Acemoglu et. al (2001), Easterly and Levine (2003) and Rodrik et. al (2004) argue that the role of geography in explaining cross-country differences in per income is secondary and operates mainly through institutions. However, according to

[1] Our estimated models will incorporate geographical variables such as Latitude, policy variables such as government spending, inflation, trade openness among others in specifications with four proxies for quality of institutions.

[2] See also Acemoglu et. al (2004) as another work justifying the importance of institutions to understand differences in economic development among countries.

Sachs (2003) per capita income, economic growth, and other economic and demographic dimensions are strongly correlated with variables associated with geography and ecology, including climate zone, disease ecology, and distance from the coast. Malaria transmission is the variable used by Sachs (2003) to empirically validate his argument since the estimated models show a significant and direct impact on per capita income once he controls for the quality of institutions.

Rodrik et. al (2004) develop an empirical investigation of the contribution of institutions, geography and trade in explaining differences in per capita income across countries and the evidence suggests the primary role of institutions when compared with geography and trade. Integration into the world economy and quality of institutions should be treated as endogenous since they affect each other and are affected by geographical variables and by income levels. The main empirical evidence found is that once institutions are part of the 2SLS regression, integration has no direct effect on per capita income, while geography has at most weak direct effects even though they are important for the quality of institutions. Trade does not appear to be statistically significant once institutions are controlled for and it seems to have an unexpected negative sign. The estimated coefficients for the measure of property rights and the rule of law are positive and statistically significant.[3]

Regarding the use of indexes of institutional quality based on surveys of foreign and domestic investors (Rule of Law, Corruption, Investment Profile and Bureaucracy), Rodrik (2004) states that such indexes are able to capture investor´s perceptions but not exactly which are the rules governing these institutions and this is a drawback that still imposes some constraints for empirical studies. According to the author, it is crucial to distinguish between stimulating and sustaining economic growth and better and more reliable institutions are more important for the latter than the former, meaning that developing countries can boost initial growth with some minor changes in their institutional environment.

The empirical literature on growth models using panel data analysis has gained increasing attention since the work of Mankiw, Romer and Weil (1992) and subsequently Islam (1995) who uses a Difference GMM. Barro (1995) uses panel data analysis for growth models for a set of more than one hundred countries and the empirical results suggest that, for a given level of real per capita income, the growth rate is positively

[3] Easterly and Levine (2003) found similar evidence in terms of the way geography affects income levels, namely a significant and direct impact on institutions, but only anindirect effect on income.

affected by the level of education and life expectancy, low fertility, lower government consumption, by maintaining the rule of law, lower inflation rate, improvement in the terms of trade, and negatively by the initial level of real per capita GDP. Another example is Rodrik (1999) who develops an empirical analysis in order to understand why domestic social conflicts have a negative impact on productivity, their effect on the uncertainty (investment decision) of the economy and the diversion of activities out of the production sector. The indicators used are inequality, ethnic fragmentation, quality of government institutions, rule of law, democratic rights and social protection network, and there is evidence that lower GDP growth rates are associated with countries where institutions are fragile and society is more fragmented, or in other words, where social conflicts are more likely to happen.

Rajan and Subramanian (2008) develop an empirical investigation on aid and growth using cross-sectional and panel data. The estimated growth models use System GMM with proxies for institutional quality and geography and include other variables such as initial income, aid, government consumption, policy (Sachs and Warner indicator) and inflation used as instruments, provide mixed evidence for the role of institutions on long-run growth. More favorable evidence is likely to be found when the impact of aid on growth conditional on policies and geography is estimated.

Glaeser et. al (2004) provide a deeper investigation on the argument of whether or not institutions cause growth or if growth and human capital accumulation are ultimately responsible for improving the quality of institutions. The authors suggest problems with the indicators for institutional quality and they also criticize the econometric techniques using instrumental variables (IV). The OLS estimation suggests that human capital (initial level of education) is more important for growth than institutions (executive constraints) and they fnd additional empirical support for the role of variables, such as the influence of temperature and weather.

II – Econometric Methodologies for Income and Growth Models and Dealing with Weak and Too Many Instruments

The main goal of this section is to first provide a brief discussion on the econometric methodology used in our growth and per capita income models. Our growth models are estimated using panel data methods (System and Difference GMM), while for the per capita income models we use cross-section analysis

(2SLS and OGMM). We also summarize the main consequences of having weak instruments in the cross-section analysis and too many instruments in the panel data growth models.

The cross section empirical studies on per capita income differences across countries are almost always based on the use of 2SLS estimation, since this is the core method for dealing with endogenous variables, which is the institutional variable. One advantage of the 2SLS estimation is that in the presence of independent and homocedastic errors it is the most efficient estimator, but since this is not a straight forward assumption, we use a correction for heteroskedasticity in our estimates. Another possibility is to use OGMM with the heteroskedasticity correction, which is based on a weighting matrix that is different from the one used in 2SLS estimation. One of the problems associated with 2SLS estimation is how to avoid the use of weak instruments since they will result in less precise coefficients due to high standard errors and the occurrence of finite sample bias.[4]

On the estimation of growth panel data models, System and Difference GMM facilitate taking account of the time series dimension of the data, non observable country specific effects, the inclusion of a lagged dependent variable among the explanatory variables, and the possibility that all explanatory variables are endogenous. The use of instruments is required to deal with the possible endogeneity of the explanatory variables and the correlation between the error term and the lagged dependent variable. Under the assumptions that the error term is not serially correlated and the explanatory variables are weakly exogenous, lagged values of the explanatory variables can be used as instruments

Arellano and Bond (1991) developed the Difference GMM method, but the more recent literature has shown that there are possible statistical problems associated with its use and when the regressors are persistent it can be shown that lagged levels of the dependent variable and of the explanatory variables are weak instruments. Asymptotically, the use of weak instruments implies that the variance of the coefficient increases and in small samples the coefficients can be biased.

Arellano and Bover (1995) and Blundell and Bond (1998) developed a system of regressions in differences and levels (System GMM) to reduce the potential bias and inaccuracy associated with the use of Difference GMM estimator. The instruments for the regression in differences are the lagged levels of the explanatory

[4] In this paper we use the overidentification test as given by the *estat overid* command in Stata 10.0 and to evaluate the presence of weak instruments (first stage F-stat) we use the *estat firststage* command. .

variables, while the instruments for the regression in levels are the lagged differences of explanatory variables.

The consistency of the GMM estimator depends on the validity of the moment conditions and this can be tested using two specification tests: the Hansen test is a test of the overidentifying restrictions and the joint null hypothesis is that the instruments are valid, i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation; and the Arellano-Bond test for no second order serial correlation in the error term.

The last decade has spawned an increase in the number of studies addressing the issue of weak instruments in models with endogenous variables. Our empirical tests for weak instruments for cross-section analysis relies mainly on the work developed by Stock and Yogo (2005).[5] Shea (1997) is another important work which considers cases where there is more than one endogenous regressors and the key idea is to focus on the partial *R-squared* statistic.

When testing for weak instruments with only one endogenous regressor, Staiger and Stock (1997) developed a rule of thumb where one should declare instruments to be weak if the first-stage *F*-statistic is less than 10. According to Stock and Yogo (2005) this rule of thumb fares less well from the perspective of size distortion and when the number of instruments is one or two the rule of thumb corresponds to a 5% level test that the maximum size is no more than 15%, meaning that the maximum 2SLS size distortion is no more than 10%. The problem is more severe when the number of instruments increases so that the critical value is larger and the rule of thumb does not provide significant control for size distortion.

The two main contributions developed by Stock and Yogo (2005) to the empirical literature on weak instruments are the following. First, they provide a formal characterization of the weak instrument set for models with a different number of endogenous regressors and, second, they developed a test of whether the given instruments fall in this set, which is an indication that instruments are weak. It should be mentioned that the size of the test is controlled asymptotically under the null of weak instruments. When evaluating the weak instrument test as a decision rule the test is based on a comparison of the minimum eigenvalue statistics with the critical values, and if it is less than the critical value there is evidence of weak

[5] See Stock et. al (2002) and Hahn and Hausman (2003) for surveys on weak instruments.

instruments.[6]

Recently, studies such as Roodman (2009) develop a detailed analysis on instrument proliferation when using GMM Difference and GMM System. The System GMM uses lagged variables in levels to instrument the differenced equation and lagged differences to instrument levels, which is more likely to end up with too many instruments when compared to the GMM Difference estimator. Roodman discusses the symptoms of instrument proliferation showing that as the time dimension increases, the number of instruments can be too large compared to the sample size and the outcome is that some asymptotic results and specification tests are not valid. Too many instruments can over fit endogenous variables and fail to expunge their endogenous components, resulting in biased coefficients.

Another argument is that the Hansen and Difference-in-Hansen (for System GMM) tests can be weak in the presence of overidentification. In general, researchers rely on high *p*-values for the Hansen test as a test for instrument validity but such tests have problems when there is instrument proliferation.[7] It is worth mentioning that the Sargan and difference-in-Sargan tests are based on an estimation of the optimal weighting matrix and are less vulnerable to instrument proliferation, but such tests require homoskedastic errors for consistency, which is not an easy assumption.

Our estimated growth models use the two-step procedure with the Windmeijer (2005) correction, which deals with average bias reduction. The downward bias in two-step standard errors is an issue since the coefficient standard errors in two-step GMM tend to be severely downward biased when the number of instruments is too high.

Bazzi and Clemens (2009) develop an empirical analysis on growth and income levels, focusing on the issue of weak and instrument proliferation by comparing different data sets and using distinct econometric techniques.[8] The results show that there is evidence of weak instruments and excessive number of

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[6] The critical values for the Stock and Yogo (2005) test depends on the IV estimator used, the number of instruments, the number of endogenous regressors and how much bias or size distortion the researcher is willing to accept.

[7] Another test to check if the set of instruments is valid is the difference-in-Hansen test, which checks the validity of a subset of instruments. A common case of weak Sargan and Hansen tests caused by too many instruments is when researchers face p-values of 1.000.

[8] Durlauf et. al (2005) is another study reviewing the empirical literature on growth and income models and it points out for the problems of correcting identifying valid instrumental variables.

instruments in most previous empirical work on income levels and growth models, suggesting that any empirical investigation should be able to investigate how much of the variance in the endogenous variables is explained by the instruments. The problem is that we still do not have a standard test for weak instruments in dynamic panel GMM regressions, which is not the case for cross-section models with tests like Stock and Yogo (2005).[9]

The literature on weak and too many instruments has contributed to raising concerns on how to estimate and the reliance that can be placed on the empirical findings from growth and income models. This literature also sheds light on the need to be careful to use valid instruments as well as to improve data collection and in how to construct better indicators for quality of institutions and their use in growth and cross-section per capita income models.

III – Empirical Findings: Cross-Section and Panel Data Analysis

In this section we present the empirical results from the cross-section estimation using 2SLS and OGMM (tables 1, 2 and 3) and for GMM System and Difference estimation of panel data (tables 4 to 9) and tests for weak and proliferation of instruments.

III.1 – Cross-Section per Capita Income Models: 2SLS and OGMM

The first set of results for the cross-section models are presented in table 1, where the dependent variable is real per capita GDP using a complete and restricted (countries with data for settler mortality) sample. Each estimated coefficient for the four proxies of institutions (Law, Bur, Corrup and Profile) has a positive sign and is statistically significant in a simple model where institution is treated as endogenous and instrumented by Latitude, Legoruk, EnglishLang and EuropeLang, where for the restricted sample SettlerMortality is an additional instrument.[10]

Regarding the endogeneity test where the null hypothesis is that the variable is exogenous we were able to reject the null for most models except when bureaucracy (Bur) is used as a proxy for institutions in model 6 for OGMM using the complete sample and in both models (2 and 6) for the restricted sample. When using the OGMM estimation for the restricted sample in model 5, with Law as a proxy for institution, we also fail

[9] See Bun and Windmeijer (2007) and Hayakawa (2007) for weak instruments bias of System GMM.

[10] See table 1A of the appendix for the definition of each variable and the data source.

to reject the null. The overidentification tests were implemented to check if the instruments are valid and for both the complete and restricted samples we reject the null hypothesis that the instruments are valid for models including Law and Bur, regardless if we use 2SLS or OGMM.

The first set of empirical results from the simple cross-section income levels models demonstrates that there is some preliminary evidence that institutions do matter in explaining income differences among countries, based on the robustness of positive and significantly estimated coefficients, but there is still some evidence that the instruments are not valid in some cases (Law and Bur) and especially for bureaucracy (Bur).

Table 1- Cross-Section Per Capita GDP Models (Complete and Restricted Samples): 2SLS and OGMM - Institution as the Only Explanatory Variable

Complete Sample	2SLS	2SLS	2SLS	2SLS	OGMM	OGMM	OGMM	OGMM
Models	1	2	3	4	5	6	7	8
Law	0.793				0.815			
	(0.000)***				(0.000)***			
Bur		1.043				0.994		
		(0.000)***				(0.000)***		
Corrup			0.916				0.907	
			(0.000)***				(0.000)***	
Profile				1.065				1.044
				(0.000)***				(0.000)***
F-Stat First Stage: (Prob)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Overid (Prob)	0.041	0.004	0.243	0.497	0.041	0.004	0.243	0.497
Endogeneity Test (Prob)	0.004	0.006	0.000	0.000	0.028	0.236	0.003	0.000
Restricted Sample	2SLS	2SLS	2SLS	2SLS	OGMM	OGMM	OGMM	OGMM
Models	1	2	3	4	5	6	7	8
Law	0.777				0.79			
	(0.000)***				(0.000)***			
Bur		0.908				0.897		
		(0.000)***				(0.000)***		
Corrup			1.061				1.032	
			(0.000)***				(0.000)***	
Profile				1.021				0.981
				(0.000)***				(0.000)***
F-Stat First Stage: (Prob)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Overid (Prob)	0.014	0.004	0.179	0.123	0.014	0.004	0.179	0.123
Endogeneity Test (Prob)	0.038	0.135	0.012	0.008	0.318	0.799	0.082	0.032

Overid (Prob) is the test for overidentification restrictions. Null hypothesis: instruments are valid
Endogeneity Test (Prob): Null hypothesis of exogenous variables
P-values in parenthesis
Instruments: Latitude, Legoruk, EnglishLang and EuropeLang. Restricted sample includes SettlerMortality as an additional instrument

The idea underlying the estimates in table 2 is to first include Latitude (models 1 to 4) as an explanatory variable and then expand the models (5 to 8) with Trade, using only one institution variable at a time. The next step is to include Law and one additional institution variable, initially including only Latitude as an explanatory variable (models 9, 11 and 13) and then estimating the same models with Trade (models 10, 12 and 14).

The estimated results contained in Table 2 are similar to those in table 1, where all the estimated coefficients for institutions are positive and statistically significant when they are included as a single proxy for institutions (models 1 to 8). For such models with only one institutional variable the instruments used are not valid for models 1 (Law) and 2 (Bur), and when using OGMM for Bur in model 6. The endogeneity tests reveal that models including Bur as proxy for institution fail to reject the null of exogeneity, which is also the case for Law in model 1.

Table 2- Cross-Section Per Capita GDP Models (Complete Sample): 2SLS and OGMM

2SLS - Models	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Latitude	-0.964	1.862	-1.494	0.59	-2.16	1.611	-1.863	0.396	-3.654	-5.468	-0.92	-1.39	3.991	3.518
	(0.527)	(0.026)**	(0.493)	(0.544)	(0.276)	(0.045)**	(0.368)	(0.666)	(0.594)	(0.423)	(0.739)	(0.595)	(0.493)	(0.534)
Law	0.962				1.178				2.031	2.601	-0.532	-0.404	-1.321	-1.128
	(0.000)***				(0.001)***				(0.410)	(0.246)	(0.538)	(0.683)	(0.530)	(0.565)
Bur		0.635				0.71			-0.826	-1.187				
		(0.001)***				(0.000)***			(0.655)	(0.482)				
Corrup			1.211				1.286				1.697	1.65		
			(0.008)***				(0.003)***				(0.092)*	(0.109)		
Profile				0.937				0.98					1.901	1.749
				(0.000)***				(0.000)***					(0.232)	(0.210)
Trade					-0.234	0.269	-0.087	-0.267		-0.743		-0.002		-0.169
					(0.374)	(0.034)**	(0.723)	(0.224)		(0.449)		(0.995)		(0.712)
Overid (Prob)	0.041	0	0.382	0.361	0.112	0.67	0.498	0.457	0.172	0.428	0.396	0.392	0.78	0.781
Endogeneity Test (Prob)	0.068	0.822	0.022	0.025	0.003	0.656	0.003	0.003	0.183	0.003	0.019	0.008	0.011	0.005
OGMM - Models	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Latitude	-0.798	1.349	-1.992	0.813	-2.16	1.222	-2.304	0.622	-2.499	-6.417	-1.397	-1.673	4.107	3.63
	(0.595)	(0.066)*	(0.380)	(0.353)	(0.291)	(0.104)	(0.290)	(0.452)	(0.635)	(0.382)	(0.636)	(0.557)	(0.477)	(0.523)
Law	0.96				1.205				1.57	2.817	-0.616	-0.522	-1.317	-1.143
	(0.000)***				(0.001)***				(0.407)	(0.242)	(0.515)	(0.628)	(0.528)	(0.563)
Bur		0.706				0.756			-0.396	-1.212				
		(0.000)***				(0.000)***			(0.708)	(0.503)				
Corrup			1.317				1.386				1.907	1.856		
			(0.005)***				(0.002)***				(0.077)*	(0.091)*		
Profile				0.877				0.915					1.866	1.74
				(0.000)***				(0.000)***					(0.234)	(0.213)
Trade					-0.229	0.212	-0.171	-0.199		-0.858		-0.059		-0.137
					-0.398	(0.074)*	-0.491	-0.325		(0.419)		(0.872)		(0.759)
Overid (Prob)	0.041	0.000	0.381	0.361	0.112	0.000	0.498	0.457	0.172	0.428	0.396	0.392	0.78	0.781
Endogeneity Test (Prob)	0.206	0.788	0.008	0.045	0.034	0.694	0.000	0.005	0.618	0.011	0.011	0.003	0.012	0.005
Weak Instruments Tests														
Robust F	2.142	9.554	2.729	6.856	2.085	7.191	2.947	4.989	2.142	2.085	2.142	2.085	2.142	2.085
Robust F Second Endogenous									9.554	7.191	2.729	2.947	6.856	4.989
Min Eigenvalue Statistics	2.141	5.355	2.166	2.947	2.707	5.513	2.849	4.777	0.267	0.594	0.63	0.494	0.377	0.34
2SLS Size of Nominal 5% Wald Test	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	13.43	13.43	13.43	13.43	13.43	13.43

Robust F = Null Hypothesis (coefficients for instruments are jointly equal to zero)
Min Eigenvalue Statistics (Stock and Yogo, 2005) Null hypothesis of Weak Instruments
Tests for Weak Instruments are the same for GMM and 2SLS in each model
Exogenous Variables (Latitude and Trade) and Instruments: Legoruk, EnglishLang and EuropeLang
Second Endogenous = Buroc, Corrup or Profile
P-values in parenthesis
*, ** and *** indicates significance at 10%, 5% and 1% respectively

When examining the weak instrument tests for the first eight models with only one endogenous variable, and using the rule of thumb from Staiger and Stock (1997) that an F statistic lower than 10 is an indication of weak instruments, we can see that in all cases we have some preliminary indication of weak instruments, which is confirmed by the minimum eigenvalue statistics from Stock and Yogo (2005) that are all lower than the 2SLS size of the nominal 5% Wald test.

For the estimated models with two variables for institutions (models 9 to 14) we could only find significant estimated coefficients for corruption in models 11 (2SLS and OGMM) and 12 (OGMM) but only at the 10% significance level. The overidentification tests reject the null that the instruments are valid in all models and we have an indication that Law and Bur in the same model (9) should not be considered as endogenous variables. The weak instrument tests for models with two institutional variables revealed that the Robust F are all lower than 10, suggesting the existence of weak instruments, which is confirmed by the minimum eigenvalue statistics lower than the 2SLS size of the nominal 5% Wald test.

Table 3 provides a comparison with the estimated models from table 2, but applied to a restricted sample of countries where *SettlerMortality* data was available. In terms of estimated coefficients and significance, the results are robust when comparing the two sets of countries and the striking difference seems to be associated with the overidentification tests: in table 2 we were able to reject the null in only three out of fourteen cases, while in table 3 rejection of the null occurred for almost all estimated models, with the exception of models 13 and 14. Therefore the use of an additional instrument *(SettlerMortality*) in a more restricted sample of countries has brought additional evidence that the set of instruments are not valid in modeling institutions variables.

Table 3- Cross-Section Per Capita GDP Models (Restricted Sample): 2SLS and OGMM

2SLS - Models	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Latitude	-0.767	1.209	-0.716	-0.680	-1.512	1.545	-0.887	-1.922	0.259	-1.151	-0.187	-0.167	0.818	-1.282
	(0.497)	(0.137)	(0.621)	(0.592)	(0.320)	(0.061)*	(0.577)	(0.182)	(0.815)	(0.501)	(0.921)	(0.938)	(0.896)	(0.703)
Law	0.932				1.072				0.401	0.923	-0.408	-0.418	-2.772	-1.297
	(0.000)***				(0.000)***				(0.353)	(0.075)*	(0.568)	(0.593)	(0.683)	(0.595)
Bur		0.831				0.834			0.513	0.137				
		(0.000)***				(0.000)***			(0.224)	(0.766)				
Corrup			1.220				1.267				1.600	1.634		
			(0.000)***				(0.000)***				(0.068)*	(0.070)*		
Profile				1.191				1.377					4.358	2.773
				(0.000)***				(0.000)***					(0.574)	(0.318)
Trade					-0.144	0.353	-0.177	-0.640		-0.081		0.092		-0.999
					(0.537)	(0.007)***	(0.936)	(0.054)**		(0.785)		(0.717)		(0.341)
Overid (Prob)	0.015	0.001	0.062	0.031	0.020	0.000	0.087	0.058	0.000	0.003	0.074	0.085	0.796	0.483
Endogeneity Test (Prob)	0.023	0.231	0.021	0.003	0.002	0.118	0.006	0.000	0.313	0.054	0.030	0.013	0.002	0.000
OGMM - Models	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Latitude	0.012	1.115	-0.025	-1.015	-0.715	1.093	-0.375	-2.230	0.411	-0.710	0.470	0.143	-0.571	-2.628
	(0.990)	(0.155)	(0.986)	(0.436)	(0.624)	(0.160)	(0.826)	(0.124)	(0.704)	(0.696)	(0.818)	(0.951)	(0.930)	(0.399)
Law	0.847				1.032				0.373	1.013	-0.463	-0.351	-2.865	-1.071
	(0.000)***				(0.000)***				(0.395)	(0.047)**	(0.544)	(0.670)	(0.700)	(0.659)
Bur		0.762				0.796			0.424	-0.024				
		(0.000)***				(0.000)***			(0.328)	(0.957)				
Corrup			1.287				1.359				1.798	1.717		
			(0.000)***				(0.000)***				(0.052)*	(0.065)*		
Profile				1.277				1.473					4.864	2.841
				(0.000)***				(0.000)***					(0.564)	(0.307)
Trade					-0.080	0.257	-0.197	-0.719		-0.086		-0.141		-1.144
					(0.720)	(0.034)**	(0.339)	(0.039)**		(0.777)		(0.598)		(0.263)
Overid (Prob)	0.015	0.001	0.062	0.031	0.02	0.000	0.087	0.058	0.000	0.003	0.074	0.085	0.796	0.483
Endogeneity Test (Prob)	0.574	0.827	0.082	0.028	0.194	0.66	0.008	0.001	0.961	0.482	0.048	0.025	0.021	0.009
Weak Instruments Tests														
Robust F	2.722	7.996	2.891	5.46	3.396	7.665	2.662	4.389	2.722	3.396	2.722	3.396	2.722	3.396
Robust F Second Endogenous									7.996	7.665	2.891	2.662	5.46	4.389
Min Eigenvalue Statistics	2.98	6.875	3.016	1.99	3.047	6.681	3.354	2.556	0.903	0.951	1.071	0.892	0.068	0.183
2SLS Size of Nominal 5% Wald Test	24.58	24.58	24.58	24.58	24.58	24.58	24.58	24.58	16.87	16.87	16.87	16.87	16.87	16.87

Robust F = Null Hypothesis (coefficients for instruments are jointly equal to zero)

Min Eigenvalue Statistics (Stock and Yogo, 2005) Null hypothesis of Weak Instruments

Tests for Weak Instruments are the same for GMM and 2SLS in each model

Exogenous Variables (Latitude and Trade) and Instruments: Legoruk, EnglishLang and EuropeLang

Second Endogenous = Buroc, Corrup or Profile

P-values in parenthesis

*, ** and *** indicates significance at 10%, 5% and 1% respectively

The weak instrument tests for the restricted sample have the same interpretation as previously (table 2) and regardless if we use the rule of thumb (Robust F lower than 10) from Staiger and Stock (1997) or the minimum eigenvalue statistics from Stock and Yogo (2005) there is evidence of weak instruments.

III.2 – Dynamic Panel Data Analysis: System and Difference GMM

The panel data model is estimated for the complete sample (91 countries) and for developing countries over the period 1980-2004. The data used are transformed and are based on averages for non-overlapping periods of five years (1980-1984, 1985-1989, 1990-1994, 1995-1999, 2000-2004), so that there are five data entries for each country for each variable in the sample. There is no data for all countries, time and variables, so the estimated panel is an unbalanced one. The variables used in the econometric estimation are reported on table 1A of the appendix, where the variables are in the logarithmic form, except for the time dummies and the indexes of institution quality.[11]

The results from the per capita GDP growth model using panel data GMM System and Difference estimation for the complete sample, with only one institutional variable, are presented in table 4 and regarding the role of institutions (Law, Bur, Corrup and Profile) most coefficients have the expected positive sign except for corruption in models 10 and 11. The significant coefficients are reported for Law in two models (1 and 4) and Profile for models 14 and 16. There are other control variables that are statistically significant in our estimated models, such as government consumption (Gov), a policy variable, population growth (Pop), human capital (Educ), measured by schooling years, and inflation (Inf).

The negative coefficients for Gov is an indication that long-run growth is linked to better fiscal discipline and the coefficients are significant regardless of using a more parsimonious model or not and using either System or Difference GMM. With respect to population growth, the significant negative coefficients are obtained when using the System GMM. Education seems to matter and it has a positive and statistically significant coefficient when using System GMM and for models with additional variables such as credit, population growth and terms of trade. Inflation has a negative and statistically significant coefficient (when Profile is the institutional variable) indicating that macroeconomic stability is important for long-run growth.

[11] The index for Law, Bur, Corrup and Profile were constructed so that the higher the value, the better the environment regarding law enforcement and property rights, there is less bureaucracy and corruption and the government is more likely to adopt measures to attract investments.

In almost all estimated models we do not reject the null of no second order autocorrelation for the AR(2) test, except for model 13. The Hansen overidentification test indicates that instruments are valid for all models but when examining the Hansen Diff test for the system GMM models there is indication of problems with the set of instruments for the more parsimonious model.

Table 4- Real GDP Growth Models: GMM System and Difference (Complete Sample) - Only One Institutional Variable

Estimation Method	System	System	Diff	Diff	System	System	Diff	Diff	System	System	Diff	Diff	System	System	Diff	Diff
Models	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Growthppp -1	0.103	0.157	-0.097	-0.157	0.152	0.153	-0.091	-0.076	0.187	0.2	-0.098	-0.118	0.141	0.121	-0.104	-0.189
	(0.245)	(0.057)**	(0.106)	(0.046)**	(0.112)	(0.084)*	(0.138)	(0.238)	(0.055)*	(0.014)**	(0.088)*	(0.104)	(0.110)	(0.159)	(0.058)*	(0.011)**
Yinitial	-0.008	-0.052	-0.293	-0.233	0.009	-0.043	-0.313	-0.197	0.018	-0.029	-0.318	-0.2	-0.008	-0.038	-0.345	-0.208
	(0.762)	(0.015)**	(0.000)***	(0.005)***	(0.690)	(0.044)**	(0.000)***	(0.012)**	(0.443)	(0.165)	(0.002)***	(0.013)**	(0.769)	(0.257)	(0.000)***	(0.001)***
Educ	0.005	0.089	-0.007	-0.217	0.013	0.082	0.078	-0.048	0.029	0.107	0.042	-0.184	0.064	0.108	0.021	-0.181
	(0.907)	(0.097)*	(0.952)	(0.172)	(0.757)	(0.077)*	(0.539)	(0.760)	(0.567)	(0.031)**	(0.772)	(0.305)	(0.138)	(0.071)**	(0.877)	(0.220)
Law	0.037	0.021	0.016	0.027												
	(0.002)***	(0.171)	(0.196)	(0.086)*												
Bur					0.018	0.015	0.000	-0.027								
					(0.159)	(0.208)	(0.991)	(0.198)								
Corrup									0.005	-0.015	-0.007	0.000				
									(0.752)	(0.196)	(0.664)	(0.990)				
Profile													0.012	0.026	0.003	0.012
													(0.113)	(0.000)***	(0.659)	(0.013)**
Trade	0.006	-0.02	0.057	0.03	0.008	-0.014	0.077	0.124	0.004	-0.027	0.066	0.058	-0.017	-0.011	0.075	0.033
	(0.789)	(0.291)	(0.349)	(0.773)	(0.717)	(0.561)	(0.159)	(0.205)	(0.883)	(0.271)	(0.330)	(0.600)	(0.436)	(0.699)	(0.210)	(0.700)
Gov	-0.104	-0.126	-0.122	-0.153	-0.107	-0.144	-0.153	-0.218	-0.099	-0.096	-0.154	-0.162	-0.111	-0.132	-0.135	-0.124
	(0.011)***	(0.001)***	(0.033)**	(0.012)**	(0.007)***	(0.001)***	(0.000)***	(0.005)***	(0.004)***	(0.030)**	(0.002)***	(0.030)**	(0.018)**	(0.006)***	(0.046)**	(0.059)*
Inf	0.002	-0.011	-0.007	-0.009	-0.004	-0.009	-0.013	-0.018	-0.004	-0.005	-0.012	-0.016	-0.013	-0.017	-0.012	-0.019
	(0.867)	(0.243)	(0.209)	(0.408)	(0.655)	(0.263)	(0.127)	(0.124)	(0.619)	(0.562)	(0.110)	(0.082)*	(0.146)	(0.062)**	(0.092)*	(0.010)***
Credit		-0.018		-0.048		-0.001		-0.038		0.000		-0.070		-0.037		-0.065
		(0.328)		(0.093)*		(0.974)		(0.268)		(0.988)		(0.042)**		(0.203)		(0.106)
Pop		-0.058		-0.019		-0.060		-0.012		-0.058		-0.022		-0.043		-0.027
		(0.006)***		(0.176)		(0.002)***		(0.686)		(0.003)***		(0.261)		(0.049)**		(0.175)
TermsTrade		0.005		-0.008		0.010		-0.014		0.020		-0.009		-0.010		-0.009
		(0.885)		(0.546)		(0.755)		(0.313)		(0.541)		(0.578)		(0.726)		(0.606)
AR(2)	0.17	0.261	0.925	0.599	0.099	0.216	0.891	0.47	0.046	0.179	0.928	0.938	0.034	0.307	0.896	0.513
Hansen	0.208	0.873	0.335	0.313	0.293	0.761	0.338	0.237	0.181	0..879	0.435	0.524	0.289	0.852	0.299	0.722
Hansen Diff	0.02	1.000			0.045	0.999			0.015	1.000			0.045	0.983		
Number of Groups	80	72	78	70	80	72	78	70	79	72	77	70	80	72	78	70
Number Instruments	72	90	48	60	72	90	48	60	72	90	48	60	72	90	48	60

Estimation includes time dummies and a dummy for Africa
*, ** and *** = signifficant at 10%, 5% and 1%
AR(2), Hansen, Hansen Diff reports the Probability

The next step is to expand the model including Law and one additional institution variable at a time, and these results are reported in table 5 (models 1 to 12), where the remaining four models are the ones when all four institutional variables are included in each model. For the first twelve models with two institutional variables, Law is the one with more significant estimated coefficients in seven out of the first twelve models, while Profile is significant using System GMM. The coefficients for the other two institutional variables, bureaucracy and corruption, are not statistically significant in any of the models including two institutional variables. The last four estimated models from table 5 reveal that the coefficients are statistically significant in model 13 for Law, Bur in model 16, but with an unexpected negative sign, Profile in three models (13, 14 and 16) and for Corrup there is no significance in any of the four models.

Regarding the other control variables, we can say that the results from table 5 are similar to the ones reported in table 4, where government spending has negative and statistically significant coefficients in thirteen out of sixteen models, population growth has negative and statistically significant coefficients when using the System GMM estimation, and some evidence for significant coefficients for Inf and Educ. One result that is different comparing tables 5 and 4 is that Credit is significant for both System and Difference GMM for the models with Law and Bur and Law and Corrup, but with an unexpected negative sign.

Table 5- Real GDP Growth Models: GMM System and Difference (Complete Sample): Two or More Institutional Variable

Estimation Method	System	System	Diff	Diff	System	System	Diff	Diff	System	System	Diff	Diff	System	System	Diff	Diff
Models	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Growthppp -1	0.109	0.154	-0.096	-0.11	0.123	0.148	-0.113	-0.155	0.084	0.082	-0.108	-0.158	0.08	0.137	-0.149	-0.154
	(0.215)	(0.045)**	(0.136)	(0.126)	(0.208)	(0.030)**	(0.052)*	(0.035)**	(0.352)	(0.359)	(0.079)*	(0.025)**	(0.250)	(0.146)	(0.035)**	(0.086)*
Yinitial	-0.018	-0.046	-0.306	-0.237	-0.003	-0.034	-0.335	-0.254	-0.034	-0.045	-0.341	-0.215	-0.046	-0.055	-0.36	-0.207
	(0.495)	(0.078)*	(0.000)***	(0.004)***	(0.887)	(0.159)	(0.000)***	(0.000)***	(0.158)	(0.070)*	(0.000)***	(0.003)***	(0.063)*	(0.061)*	(0.000)***	(0.002)***
Educ	0.014	0.088	-0.01	-0.111	0.028	0.129	-0.051	-0.26	0.032	0.099	-0.024	-0.153	0.041	0.082	-0.059	-0.122
	(0.736)	(0.055)*	(0.929)	(0.503)	(0.559)	(0.003)***	(0.690)	(0.050)**	(0.398)	(0.030)**	(0.854)	(0.234)	(0.295)	(0.153)	(0.661)	(0.421)
Law	0.037	0.023	0.013	0.03	0.038	0.033	0.028	0.03	0.033	0.018	0.007	0.024	0.029	0.026	0.016	0.026
	(0.000)***	(0.131)	(0.417)	(0.064)*	(0.028)**	(0.044)**	(0.109)	(0.044)**	(0.002)***	(0.145)	(0.545)	(0.064)*	(0.020)**	(0.131)	(0.329)	(0.120)
Bur	0.003	0.003	-0.004	-0.029									0.004	-0.0005	-0.014	-0.029
	(0.782)	(0.831)	(0.812)	(0.167)									(0.752)	(0.972)	(0.519)	(0.061)*
Corrup					-0.009	-0.018	-0.011	-0.004					-0.002	-0.012	-0.001	0.012
					(0.597)	(0.179)	(0.482)	(0.708)					(0.866)	(0.348)	(0.952)	(0.457)
Profile									0.014	0.024	0.002	0.007	0.021	0.024	0.01	0.014
									(0.038)**	(0.000)***	(0.785)	(0.132)	(0.004)***	(0.000)***	(0.229)	(0.020)**
Trade	-0.005	-0.015	0.057	0.081	-0.015	-0.02	0.043	0.039	0.005	-0.0004	0.06	0.026	0.001	0.008	0.064	0.099
	(0.788)	(0.424)	(0.292)	(0.397)	(0.542)	(0.421)	(0.617)	(0.643)	(0.776)	(0.989)	(0.338)	(0.729)	(0.959)	(0.731)	(0.354)	(0.179)
Gov	-0.098	-0.133	-0.125	-0.18	-0.097	-0.084	-0.121	-0.143	-0.093	-0.142	-0.105	-0.142	-0.071	-0.071	-0.113	-0.158
	(0.006)***	(0.001)***	(0.024)**	(0.004)***	(0.009)***	(0.018)**	(0.121)	(0.015)**	(0.018)**	(0.001)***	(0.152)	(0.019)**	(0.038)**	(0.137)	(0.074)*	(0.007)***
Inf	-0.003	-0.014	-0.009	-0.013	-0.001	-0.003	-0.007	-0.01	-0.001	-0.013	-0.009	-0.011	-0.001	-0.003	-0.012	-0.019
	(0.735)	(0.092)*	(0.235)	(0.291)	(0.890)	(0.681)	(0.252)	(0.276)	(0.857)	(0.059)*	(0.113)	(0.174)	(0.868)	(0.718)	(0.155)	(0.044)**
Credit		-0.023		-0.03		-0.034		-0.048		-0.036		-0.053		-0.027		-0.052
		(0.293)		(0.285)		(0.099)*		(0.092)*		(0.087)*		(0.072)*		(0.194)		(0.138)
Pop		-0.049		-0.008		-0.036		-0.022		-0.037		-0.014		-0.037		-0.011
		(0.014)**		(0.661)		(0.080)*		(0.114)		(0.023)*		(0.359)		(0.005)***		(0.516)
TermsTrade		-0.011		-0.013		0.004		-0.009		-0.003		-0.01		0.014		-0.008
		(0.710)		(0.224)		(0.916)		(0.450)		(0.908)		(0.285)		(0.759)		(0.558)
AR(2)	0.158	0.208	0.964	0.807	0.089	0.291	0.858	0.583	0.171	0.59	0.912	0.565	0.143	0.561	0.707	0.378
Hansen	0.343	0.958	0.258	0.29	0.308	0.968	0.468	0.411	0.466	0.988	0.234	0.463	0.788	0.999	0.247	0.642
Hansen Diff	0.102	1.000			0.125	1.000			0.149	1.000			0.838	1.000		
Number of Groups	80	72	78	70	79	72	77	70	80	72	78	70	79	72	77	70
Number of Instruments	81	99	54	66	81	99	54	66	81	99	54	66	99	117	66	78

Estimation includes time dummies and a dummy for Africa
*, ** and *** = signifficant at 10%, 5% and 1%
AR(2), Hansen, Hansen Diff reports the Probability

The AR(2) tests suggest that the estimated models for the complete sample (tables 4 and 5) do not have problems of second order autocorrelation. On the other hand the overidentification tests, especially for the Hansen Diff test, there is evidence that either the set of instruments are not valid (p-values lower than 0.05) or they are close to 1.000 which an indication of instrument proliferation.

In order to check for the robustness of our empirical results for the long-run growth models we have estimated the same models but restricting the sample to developing countries, and the results are summarized on tables 6 and 7.

Examining the results from table 6 we can see that Law has a positive and significant coefficient for three out of four models, while Profile has positive and significant coefficients for the two expanded models (14 and 16). The estimated coefficients for bureaucracy and corruption are not statistically significant for all model specifications and estimation methods. The results for the institutions variables are robust when compared to the complete sample from table 4. The coefficient for government spending is negative and statistically significant for most models, population growth is statistically significant for the expanded model, when using bureaucracy and investment profile, and there is less evidence that education is statistically significant. In sum, the results contained in Table 6 are very similar to those for the complete sample (table 4).

Table 6- Real GDP Growth Models: GMM System and Difference (Developing Countries) - Only One Institutional Variable

Estimation Method	System	System	Diff	Diff	System	System	Diff	Diff	System	System	Diff	Diff	System	System	Diff	Diff
Models	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Growthppp -1	0.157	0.054	-0.013	-0.126	0.203	0.123	-0.017	-0.060	0.224	0.228	0.011	-0.090	0.170	0.075	0.000	-0.126
	(0.054)**	(0.568)	(0.857)	(0.236)	(0.031)**	(0.173)	(0.812)	(0.524)	(0.012)**	(0.011)**	(0.880)	(0.411)	(0.070)*	(0.438)	(0.996)	(0.219)
Yinitial	0.016	-0.062	-0.215	-0.233	0.025	-0.052	-0.253	-0.196	0.018	-0.039	-0.231	-0.188	-0.008	-0.062	-0.242	-0.172
	(0.612)	(0.097)*	(0.014)**	(0.008)***	(0.511)	(0.057)*	(0.052)*	(0.029)**	(0.466)	(0.144)	(0.056)*	(0.061)**	(0.825)	(0.034)**	(0.098)*	(0.091)*
Educ	0.027	0.095	0.163	-0.104	0.015	0.102	0.169	0.034	0.032	0.126	0.169	-0.077	0.054	0.094	0.331	0.189
	(0.627)	(0.265)	(0.415)	(0.619)	(0.783)	(0.084)*	(0.550)	(0.902)	(0.571)	(0.121)	(0.494)	(0.775)	(0.271)	(0.087)*	(0.088)*	(0.412)
Law	0.024	0.032	0.012	0.050												
	(0.068)*	(0.016)**	(0.427)	(0.023)**												
Bur					0.011	0.015	-0.010	-0.024								
					(0.550)	(0.291)	(0.559)	(0.212)								
Corrup									-0.007	0.004	-0.025	0.005				
									(0.617)	(0.787)	(0.180)	(0.727)				
Profile													0.020	0.032	0.019	0.034
													(0.128)	(0.003)***	(0.269)	(0.003)***
Trade	-0.013	-0.053	0.127	0.075	0.015	-0.002	0.113	0.128	-0.001	-0.016	0.139	0.077	0.000	-0.021	0.144	0.096
	(0.571)	(0.066)*	(0.118)	(0.299)	(0.681)	(0.958)	(0.228)	(0.173)	(0.964)	(0.590)	(0.134)	(0.479)	(0.989)	(0.501)	(0.080)*	(0.277)
Gov	-0.104	-0.103	-0.152	-0.126	-0.098	-0.104	-0.153	-0.212	-0.087	-0.063	-0.184	-0.139	-0.079	-0.112	-0.169	-0.165
	(0.012)**	(0.010)***	(0.018)**	(0.104)	(0.056)**	(0.016)**	(0.021)**	(0.003)***	(0.011)**	(0.244)	(0.009)***	(0.096)*	(0.255)	(0.108)	(0.027)**	(0.010)***
Inf	0.000	-0.012	-0.007	-0.010	0.000	-0.004	-0.011	-0.016	0.001	0.000	-0.009	-0.018	-0.003	-0.009	-0.007	-0.010
	(0.999)	(0.375)	(0.500)	(0.394)	(0.974)	(0.753)	(0.321)	(0.164)	(0.937)	(0.992)	(0.468)	(0.127)	(0.785)	(0.420)	(0.361)	(0.377)
Credit		0.022		-0.081		0.020		-0.032		0.008		-0.072		-0.007		-0.048
		(0.575)		(0.142)		(0.572)		(0.418)		(0.794)		(0.108)		(0.804)		(0.402)
Pop		-0.041		-0.006		-0.073		0.007		-0.055		-0.007		-0.060		-0.007
		(0.219)		(0.808)		(0.041)**		(0.814)		(0.115)		(0.774)		(0.061)*		(0.823)
TermsTrade		-0.015		-0.026		0.000		-0.035		-0.018		-0.038		-0.024		-0.007
		(0.617)		(0.550)		(0.997)		(0.278)		(0.654)		(0.348)		(0.533)		(0.839)
AR(2)	0.663	0.378	0.767	0.674	0.578	0.300	0.994	0.407	0.352	0.161	0.830	0.785	0.333	0.240	0.940	0.799
Hansen	0.951	0.999	0.358	0.650	0.870	1.000	0.208	0.710	0.899	0.999	0.140	0.776	0.851	1.000	0.282	0.781
Hansen Diff	0.991	1.000			0.987	1.000			0.999	1.000			0.999	1.000		
Number of Groups	58	52	56	50	58	52	56	50	57	52	55	50	58	52	56	50
Number of Instruments	72	90	48	60	72	90	48	60	72	90	48	60	72	90	48	60

Estimation includes time dummies and a dummy for Africa
*, ** and *** = signifficant at 10%, 5% and 1%
AR(2), Hansen, Hansen Diff reports the Probability

The estimation of the same models with more than one institution variable (table 7) shows that the estimated coefficients for Law are positive and statistically significant in twelve out of sixteen models where previously (table 5) the evidence was similar (eight out of sixteen). The estimated coefficients for bureaucracy are only significant in two out of eight models and for corruption there is no significant estimated coefficient, which is the same as for the complete sample results. Investment profile has positive and significant coefficients in four out of eight estimated models and for the cases where all four variables are included in the model, both Profile and Law seems to be the two variables with significant coefficients.

The estimated results for the other control variables show that they are robust for developing countries and the complete sample, where the coefficients for Gov are negative and statistically significant in most models, Pop is negative and significant for System GMM for the expanded model.

Table 7- Real GDP Growth Models: GMM System and Difference (Developing Countries) Two or More Institutional Variables

Estimation Method	System	System	Diff	Diff	System	System	Diff	Diff	System	System	Diff	Diff	System	System	Diff	Diff
Models	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Growthppp -1	0.152	0.013	-0.019	-0.059	0.183	0.153	-0.021	-0.096	0.101	-0.043	-0.008	-0.107	0.098	-0.009	-0.085	-0.111
	(0.038)**	(0.914)	(-0.769)	(0.646)	(0.036)**	(0.275)	(0.758)	(0.396)	(0.296)	(0.657)	(0.914)	(0.204)	(0.377)	(0.942)	(0.204)	(0.339)
Yinitial	-0.006	-0.063	-0.258	-0.254	-0.003	-0.021	-0.299	-0.23	-0.02	-0.066	-0.287	-0.221	-0.045	-0.049	-0.327	-0.209
	(0.820)	(0.072)*	(0.004)***	(0.005)***	(0.890)	(0.609)	(0.000)***	(0.010)***	(0.584)	(0.110)	(0.042)**	(0.005)***	(0.291)	(0.286)	(0.001)***	(0.020)**
Educ	0.034	0.086	0.124	0.041	0.071	0.079	0.095	-0.119	0.057	0.118	0.276	-0.008	0.073	0.085	0.151	-0.064
	(0.445)	(0.176)	(0.571)	(0.838)	(0.069)*	(0.161)	(0.486)	(0.531)	(0.222)	(0.066)*	(0.166)	(0.968)	(0.186)	(0.172)	(0.414)	(0.711)
Law	0.034	0.036	0.021	0.045	0.036	0.053	0.033	0.057	0.031	0.028	0.011	0.035	0.036	0.025	0.023	0.032
	(0.008)***	(0.020)**	(0.131)	(0.004)***	(0.025)**	(0.023)**	(0.132)	(0.001)***	(0.025)**	(0.073)*	(0.470)	(0.063)*	(0.021)**	(0.155)	(0.066)*	(0.038)**
Bur	-0.002	0.014	-0.022	-0.038									0.009	0.007	-0.014	-0.043
	(0.883)	(0.348)	(0.147)	(0.022)**									(0.653)	(0.732)	(0.492)	(0.010)***
Corrup					-0.013	0.005	-0.035	-0.006					-0.004	0.002	-0.014	0.024
					(0.422)	(0.709)	(0.119)	(0.766)					(0.827)	(0.909)	(0.531)	(0.277)
Profile									0.02	0.039	0.012	0.021	0.027	0.037	0.022	0.027
									(0.112)	(0.000)***	(0.487)	(0.160)	(0.018)**	(0.029)**	(0.114)	(0.032)**
Trade	-0.015	-0.037	0.089	0.072	-0.019	-0.019	0.108	0.1	-0.026	-0.02	0.14	0.069	-0.02	-0.002	0.09	0.05
	(0.591)	(0.299)	(0.193)	(0.399)	(0.506)	(0.658)	(0.254)	(0.237)	(0.356)	(0.565)	(0.165)	(0.571)	(0.370)	(0.963)	(0.276)	(0.551)
Gov	-0.074	-0.089	-0.126	-0.162	-0.075	-0.05	-0.129	-0.068	-0.075	-0.118	-0.137	-0.14	-0.052	-0.065	-0.099	-0.14
	(0.071)*	(0.096)*	(0.067)*	(0.021)**	(0.047)**	(0.265)	(0.106)	(0.429)	(0.115)	(0.081)*	(0.076)*	(0.194)	(0.219)	(0.268)	(0.119)	(0.165)
Inf	-0.004	-0.015	-0.007	-0.009	0.002	-0.007	-0.001	-0.011	-0.005	-0.012	-0.006	-0.008	-0.002	-0.008	-0.004	-0.011
	(0.718)	(0.443)	(0.466)	(0.416)	(0.807)	(0.681)	(0.933)	(0.284)	(0.740)	(0.289)	(0.410)	(0.351)	(0.907)	(0.644)	(0.649)	(0.380)
Credit		0.008		-0.04		-0.028		-0.096		-0.021		-0.071		-0.038		-0.045
		(0.828)		(0.441)		(0.512)		(0.070)*		(0.565)		(0.211)		(0.441)		(0.341)
Pop		-0.044		0.017		-0.039		-0.013		-0.061		-0.006		-0.044		-0.013
		(0.169)		(0.529)		(0.180)		(0.673)		(0.012)**		(0.849)		(0.142)		(0.609)
TermsTrade		-0.011		-0.033		-0.009		-0.03		-0.003		-0.019		0.001		0.002
		(0.842)		(0.190)		(0.855)		(0.368)		(0.895)		(0.537)		(0.987)		(0.940)
AR(2)	0.712	0.663	0.916	0.479	0.534	0.683	0.879	0.678	0.578	0.753	0.999	0.837	0.536	0.904	0.874	0.9
Hansen	0.995	1.000	0.416	0.891	0.995	1.000	0.368	0.905	0.955	1.000	0.244	0.922	0.999	1.000	0.806	0.998
Hansen Diff	1.000	1.000			1.000	1.000			0.904	1.000			0.996	0.996		
Number of Groups	58	52	56	50	57	52	55	50	58	52	56	50	57	52	55	50
Number Instruments	81	99	54	66	81	99	54	66	81	99	54	66	99	117	66	78

Estimation includes time dummies and a dummy for Africa
*, ** and *** = signifficant at 10%, 5% and 1%
AR(2), Hansen, Hansen Diff reports the Probability

The AR(2) tests for the models using only developing countries suggest that the models do not have problems of second order autocorrelation. On the other hand the overidentification tests (tables 6 and 7) for the Hansen and Hansen Diff (System GMM) indicate that set of instruments are not valid (p-values close to 1.000) which is an indication of instrument proliferation.

III. 3 – Panel Growth Models with Correction for Too Many Instruments

The empirical literature on too many instruments emphasizes that a rule of thumb to detect the use of excessive number of instruments is to compare the number of groups (countries) with the number of instruments and whenever the later is greater there is indication of too many instruments. The goal is to estimate the models with more than one institution variable (tables 5 and 7), collapsing the number of instruments since those models are more likely to have too many instruments.

The results from table 8 for the complete sample show that there are fewer significant coefficients for Law - where previously the coefficient was significant in eight out of sixteen models, with the reduced number of instruments it is only significant in model 14 for System GMM. The same pattern follows for Profile where initially it has significant coefficients in five out of eight models (table 5) and with reduced instruments it is significant in only one model (14). Bureaucracy has no significant coefficient in all estimated models with fewer instruments. On the other hand, Corrup has no significant coefficient in table 5 and with the reduced number of instruments it has two significant coefficients (models 6 and 14) but with an unexpected negative sign. Once we control for the number of instruments the Hansen tests indicate that instruments are valid but we are still able to reject the null for some models when using the Hansen Diff tests.

Table 8- Real GDP Growth Models: GMM System and Difference (Complete Sample) - Collapsing the Number of Instruments

Estimation Method	System	System	Diff	Diff	System	System	Diff	Diff	System	System	Diff	Diff	System	System	Diff	Diff
Models	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Growthppp -1	0.073	0.087	-0.077	-0.177	0.098	0.084	-0.085	-0.208	0.129	0.068	-0.100	-0.214	0.082	0.052	-0.103	-0.177
	(0.523)	(0.408)	(0.344)	(0.161)	(0.409)	(0.427)	(0.310)	(0.135)	(0.222)	(0.542)	(0.226)	(0.099)*	(0.436)	(0.664)	(0.254)	(0.107)
Yinitial	0.049	-0.007	-0.409	-0.236	0.047	-0.002	-0.415	-0.230	0.060	-0.017	-0.428	-0.216	0.047	-0.022	-0.383	-0.210
	(0.154)	(0.899)	(0.010)***	(0.002)***	(0.142)	(0.971)	(0.007)***	(0.000)***	(0.133)	(0.726)	(0.013)**	(0.001)***	(0.255)	(0.520)	(0.010)***	(0.003)***
Educ	-0.014	0.061	-0.101	-0.370	-0.003	0.079	-0.064	-0.550	-0.004	0.099	-0.070	-0.416	-0.027	0.037	-0.056	-0.453
	(0.841)	(0.575)	(0.408)	(0.178)	(0.969)	(0.466)	(0.625)	(0.035)**	(0.949)	(0.243)	(0.637)	(0.108)	(0.629)	(0.645)	(0.673)	(0.102)
Law	0.005	0.000	0.004	0.024	0.020	0.015	0.015	0.036	0.006	0.004	0.005	0.037	0.012	0.031	0.012	0.027
	(0.783)	(0.989)	(0.789)	(0.321)	(0.253)	(0.505)	(0.309)	(0.102)	(0.716)	(0.801)	(0.739)	(0.146)	(0.495)	(0.094)*	(0.501)	(0.222)
Bur	-0.004	-0.007	-0.001	0.000									-0.002	0.004	-0.003	-0.006
	(0.770)	(0.740)	(0.961)	(0.989)									(0.892)	(0.831)	(0.878)	(0.796)
Corrup					-0.013	-0.033	-0.018	0.008					-0.004	-0.035	-0.014	0.025
					(0.584)	(0.089)*	(0.425)	(0.690)					(0.871)	(0.073)*	(0.595)	(0.328)
Profile									-0.002	0.008	-0.001	0.003	0.006	0.019	0.001	0.007
									(0.819)	(0.432)	(0.932)	(0.663)	(0.470)	(0.040)*	(0.870)	(0.287)
Trade	-0.035	-0.058	0.081	0.159	-0.051	-0.058	0.012	0.129	-0.013	-0.051	0.051	0.094	-0.006	-0.001	0.119	0.195
	(0.616)	(0.384)	(0.483)	(0.168)	(0.517)	(0.345)	(0.910)	(0.382)	(0.871)	(0.397)	(0.644)	(0.446)	(0.924)	(0.989)	(0.165)	(0.062)*
Gov	-0.258	-0.266	-0.108	-0.184	-0.223	-0.236	-0.073	-0.141	-0.258	-0.233	-0.099	-0.149	-0.212	-0.112	-0.136	-0.174
	(0.000)***	(0.037)**	(0.133)	(0.090)*	(0.002)***	(0.147)	(0.376)	(0.173)	(0.001)***	(0.088)*	(0.223)	(0.159)	(0.008)***	(0.255)	(0.034)**	(0.104)
Inf	-0.024	-0.021	-0.006	-0.009	-0.012	-0.015	-0.005	-0.010	-0.014	-0.024	-0.006	-0.009	-0.015	-0.011	-0.011	-0.014
	(0.129)	(0.221)	(0.488)	(0.497)	(0.384)	(0.347)	(0.497)	(0.467)	(0.329)	(0.108)	(0.514)	(0.451)	(0.221)	(0.323)	(0.188)	(0.265)
Credit		0.005		-0.081		-0.006		-0.118		-0.029		-0.108		-0.028		-0.123
		(0.903)		(0.127)		(0.895)		(0.044)**		(0.460)		(0.135)		(0.523)		(0.042)**
Pop		-0.075		-0.015		-0.070		-0.020		-0.066		-0.011		-0.077		-0.010
		(0.001)***		(0.558)		(0.001)***		(0.562)		(0.001)***		(0.659)		(0.006)***		(0.726)
TermsTrade		0.042		-0.054		0.092		-0.026		0.014		-0.020		-0.033		-0.042
		(0.666)		(0.080)*		(0.516)		(0.526)		(0.863)		(0.535)		(0.667)		(0.163)
AR(2)	0.152	0.530	0.870	0.567	0.082	0.990	0.653	0.296	0.120	0.457	0.952	0.292	0.093	0.340	0.786	0.198
Hansen	0.151	0.116	0.247	0.104	0.159	0.141	0.350	0.340	0.125	0.066	0.312	0.279	0.122	0.116	0.189	0.382
Hansen Diff	0.028	0.065			0.024	0.114			0.051	0.050			0.058	0.092		
Number of Groups	80	72	78	70	79	72	77	70	80	72	78	70	79	72	77	70
Number of Instruments	38	46	28	34	38	46	28	34	38	46	28	34	46	54	34	40

Estimation includes time dummies and a dummy for Africa

*, ** and *** = signifficant at 10%, 5% and 1%

AR(2), Hansen, Hansen Diff reports the Probability

The results for developing countries with fewer instruments (table 9) reveal that there is less evidence of significance for Law and such significance is obtained for the System GMM (models 13 and 14) when all four institutional variables are included. The results for bureaucracy are the same when compared to previous estimation when the estimated coefficients were statistically significant in one out of eight models. The same is true for corruption where there is no evidence of significance for all estimated models. Finally, investment profile has a positive and significant coefficient in all four expanded models. The overidentification test shows that we are not able to reject the null once we control for the number of instruments and there is no problem with weakening the Hansen and the Hansen Diff tests. The main conclusion from comparing the growth models with and without controlling for instrument proliferation is that there is less evidence on the role of institutions once we control for instrument proliferation.

Table 9 - Real GDP Growth Models: GMM System and Difference (Developing Countries) - Collapsing the Number of Instruments

Estimation Method	System	System	Diff	Diff	System	System	Diff	Diff	System	System	Diff	Diff	System	System	Diff	Diff
Models	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Growthppp -1	0.150	0.006	0.001	-0.118	0.116	-0.005	-0.084	-0.126	0.128	-0.014	0.023	-0.113	0.090	-0.059	-0.063	-0.150
	(0.066)*	(0.955)	(0.992)	(0.512)	(0.172)	(0.957)	(0.450)	(0.486)	(0.098)*	(0.888)	(0.855)	(0.402)	(0.192)	(0.473)	(0.562)	(0.184)
Yinitial	0.087	-0.042	-0.148	-0.230	0.084	-0.016	-0.242	-0.230	0.077	-0.043	-0.171	-0.176	0.054	-0.027	-0.207	-0.189
	(0.036)**	(0.531)	(0.285)	(0.053)*	(0.023)**	(0.773)	(0.071)*	(0.032)**	(0.128)	(0.426)	(0.360)	(0.108)	(0.274)	(0.597)	(0.144)	(0.054)*
Educ	-0.044	0.124	-0.280	-0.309	-0.028	0.097	-0.273	-0.288	-0.025	0.119	0.035	-0.106	-0.036	0.060	-0.107	-0.157
	(0.556)	(0.211)	(0.186)	(0.333)	(0.707)	(0.394)	(0.282)	(0.372)	(0.762)	(0.329)	(0.869)	(0.765)	(0.525)	(0.494)	(0.588)	(0.614)
Law	0.020	0.022	0.013	0.031	0.038	0.025	0.017	0.035	0.018	0.020	-0.001	0.038	0.024	0.031	0.014	0.042
	(0.157)	(0.254)	(0.620)	(0.218)	(0.041)**	(0.235)	(0.557)	(0.405)	(0.328)	(0.245)	(0.975)	(0.223)	(0.089)*	(0.059)*	(0.552)	(0.193)
Bur	-0.010	0.006	-0.027	-0.021									0.001	0.010	-0.014	-0.042
	(0.586)	(0.845)	(0.110)	(0.360)									(0.970)	(0.683)	(0.637)	(0.077)*
Corrup					-0.025	0.000	-0.042	-0.001					-0.012	-0.006	-0.016	0.034
					(0.325)	(0.990)	(0.152)	(0.978)					(0.694)	(0.827)	(0.694)	(0.276)
Profile									0.001	0.024	0.015	0.037	0.018	0.029	0.017	0.038
									(0.926)	(0.029)**	(0.546)	(0.096)*	(0.156)	(0.034)**	(0.508)	(0.066)*
Trade	-0.041	-0.082	0.121	0.196	-0.056	-0.058	0.062	0.152	-0.056	-0.077	0.208	0.195	-0.042	-0.051	0.124	0.202
	(0.550)	(0.078)*	(0.295)	(0.071)*	(0.483)	(0.275)	(0.572)	(0.423)	(0.393)	(0.136)	(0.116)	(0.286)	(0.572)	(0.427)	(0.253)	(0.274)
Gov	-0.246	-0.184	-0.182	-0.207	-0.193	-0.189	-0.129	-0.138	-0.233	-0.171	-0.189	-0.131	-0.172	-0.127	-0.138	-0.169
	(0.000)***	(0.061)*	(0.008)***	(0.010)***	(0.001)***	(0.049)**	(0.146)	(0.212)	(0.000)***	(0.055)*	(0.068)*	(0.308)	(0.000)***	(0.236)	(0.095)*	(0.065)*
Inf	-0.011	-0.020	-0.007	-0.006	-0.003	-0.017	-0.009	-0.006	-0.011	-0.018	0.001	-0.004	-0.008	-0.012	-0.002	-0.007
	(0.448)	(0.140)	(0.636)	(0.753)	(0.853)	(0.256)	(0.542)	(0.702)	(0.432)	(0.228)	(0.942)	(0.822)	(0.508)	(0.389)	(0.880)	(0.617)
Credit		0.027		-0.070		0.024		-0.108		0.016		-0.128		0.009		-0.098
		(0.477)		(0.374)		(0.586)		(0.287)		(0.699)		(0.177)		(0.757)		(0.191)
Pop		-0.089		0.003		-0.091		0.008		-0.098		0.014		-0.074		-0.006
		(0.064)*		(0.945)		(0.046)**		(0.861)		(0.044)**		(0.733)		(0.055)*		(0.882)
TermsTrade		-0.007		-0.038		-0.001		-0.062		-0.013		-0.026		-0.032		-0.022
		(0.940)		(0.541)		(0.995)		(0.421)		(0.845)		(0.606)		(0.300)		(0.685)
AR(2)	0.658	0.427	0.844	0.965	0.588	0.532	0.842	0.876	0.655	0.441	0.780	0.361	0.496	0.553	0.969	0.187
Hansen	0.839	0.240	0.113	0.061	0.627	0.158	0.232	0.208	0.500	0.275	0.082	0.172	0.547	0.428	0.161	0.373
Hansen Diff	0.502	0.304			0.490	0.117			0.679	0.467			0.744	0.273		
Number of Groups	58	52	56	50	57	52	55	50	58	52	56	50	57	52	55	50
Number of Instruments	38	46	28	34	38	46	28	34	38	46	28	34	46	54	34	40

Estimation includes time dummies and a dummy for Africa

*, ** and *** = signifficant at 10%, 5% and 1%

AR(2), Hansen, Hansen Diff reports the Probability

Concluding Remarks

This paper develops a theoretical and empirical investigation on cross-section income levels and panel data growth models with special attention to the issue of weak and too many instruments. The empirical evidence from the cross-section per capita GDP estimated models suggests that institutions seems to matter regardless if they are the only explanatory variable or included in models with geographical and integration variables. However we find that such models suffer from the problem of weak instruments. This evidence should not be interpreted as part of a theory by itself but as an important empirical feature suggesting that there is still room to find better instruments. The proxies for institutions used in our models although they have been widely used in the literature can be considered as imperfect in the sense that they might not capture the entire and correct institutional environment of each country, which points out for the need of further work on how to construct better proxies.

The results from the estimated growth models, with and without controlling for instrument proliferation, provide us with some important lessons: there is some mixed evidence on the role of institutions for long-run growth and such evidence is more likely to be associated with Law and Profile; government spending estimated coefficients are negative and statistically significant for most estimated models, suggesting that fiscal discipline helps foster long-run growth; population growth has a negative and statistically significant coefficient when using System GMM; reducing the number of instruments has implications in terms of fewer significant coefficients for institutional variables.

The empirical tests to detect for the existence of invalid instruments and to deal with too many instruments for the growth models reveals that in most estimated growth models either the set of instruments are not valid or they have probabilities close to 1.000, which is an indication of instrument proliferation and this seems to be even more severe when restricting the sample to developing countries. Once we control for the number of instruments there is less evidence on the role of institutions for long-run growth.

We believe our work has provided a deeper investigation of the role of institutions in determining economic growth and per capita income. Specifically, we show that there is a fair amount of empirical support for the relevance of better and more reliable institutions in fostering economic growth and in increasing income levels, but there is also an urgency for researchers to work with valid and non weak instruments and to address the issue of instrument proliferation.

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Appendix

Table 1A: Classification and Variable Description

Variables	Description	Source
Growthppp	Log difference of Real GDP per capita (PPP) growth.	World Development Indicators (2008)
GDPpercapita	Real GDP per capita (PPP) level in 2004	World Development Indicators (2008)
Yinitial	Real GDP per capita (PPP) level in 1980, 1985, 1990, 1995 and 2000	World Development Indicators (2008)
Educ	Average number of years of schooling of the population aged above 15 years in 1980, 1985, 1990, 1995, and 2000	Barro, Lee (2001)
Inf	Inflation measured by the consumer price index (annual %).	World Development Indicators (2008)
Gov	General government final consumption expenditure includes all government current expenditures for purchases of goods and services. It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation (% of GDP)	World Development Indicators (2008)
Trade	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product (% of GDP).	World Development Indicators (2008)
Credit	Domestic credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment (% of GDP).	World Development Indicators (2008)
Pop	Annual population growth rate. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship--except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of the country of origin (annual %).	World Development Indicators (2008)
Law	Two measures comprising one risk component. Each sub-component equals half of the total. The "law" sub-component assesses the strength and impartiality of the legal system, and the "order" sub-component assesses popular observance of the law (scale from zero to six).	International Country Risk Guide (2008)
Bur	Institutional strength and quality of the bureaucracy is a shock absorber that tends to minimize revisions of policy when governments change. In low-risk countries, the bureaucracy is somewhat autonomous from political pressure (scale from zero to four).	International Country Risk Guide (2008)
Corrup	A measure of corruption within the political system that is a threat to foreign investment by distorting the economic and financial environment, reducing the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability, and introducing inherent instability into the political process (scale from zero to six).	International Country Risk Guide (2008)
Profile	A measure of the government's attitude toward inward investment as determined by four components: the risk to operations, taxation, repatriation, and labor costs (scale from zero to twelve).	International Country Risk Guide (2008)
Latitude	Absolute value of the latitude of the country (i.e., a measure of distance from the equator), scaled to take values between 0 and 1, where 0 is the equator	La Porta, Lopez-de-Silanes, Shleifer, Vishny (1999)
EnglishLang and EuropeLang	"EnglishLang" and "EuropeLang" are the "first" language variables, corresponding to the fraction of the population speaking English and the fraction of the population speaking one of the major languages of Western Europe (English, French, German, Portuguese, or Spanish).	Hall, Jones (1999)
SettlerMort	Mortality is potential settler mortality, measured in terms of deaths per annum per 1,000 "mean strength" (raw mortality numbers are adjusted to what they would be if a force of 1,000 living people were kept in place for a whole year, e.g., it is possible for this number to exceed 1,000 in episodes of extreme mortality as those who die are replaced with new arrivals).	Acemoglu, Johnson, Robinson (2001)
Legoruk	Dummy variable denote the legal origin of the Company Law or Commercial Code of each country. Equals 1 if the origin is English Common Law	La Porta, Lopez-de-Silanes, Shleifer, Vishny (1999)
FrankelRomer	Frankel-Romer predicted trade share. The predicted trade share is computed from a gravity model based only on population and geography.	Hall, Jones (1999)
Terms Trade	Terms of trade shocks. Log difference of the terms of trade over period	World Development Indicators (2008)
Africa	Dummy for African Countries	
yr8084, yr8589, yr9094, yr9599, yr0004	Time dummies	