Extrinsic Determinants of Economic Growth June 2012

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Abstract *The paper empirically estimates the effects of the extrinsic uncertainty variables on economic growth. The extrinsic variables are represented by democracy, corruption and armed conflicts. In a cross-sectional study involving 127 countries, the study finds that democracy negatively affects economic growth, while polity has a positive impact on economic growth. Armed conflicts do not appear to have any statistically significant effect on economic growth.*

Key Words: *Extrinsic uncertainty, economic growth.*

JEL Classifications: *C31, C51, O47*

1. Introduction

The pursuit for economic growth remains at the forefront of the policy agenda of any economy. Economic growth indeed constitutes the necessary condition for attaining higher standard of living or human welfare, the ultimate objective of any development policy. The early growth models typically emphasized on resource endowment and/or the 'initial conditions' as the prime determinants of economic growth. The differences in resource endowments across countries partly explain the stylized fact that economic growth differs across countries. The other potential determinants are open to discussion.

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The neoclassical theory of growth describes economic growth as a function of capital, labour and technology. The neoclassical growth theory is essentially supply-oriented (Federici and Marconi, 2002) and, as such, is silent on the role of domestic policies including trade policies. However, a touch of emphasis on foreign demand can be traced into the demand-oriented theory of Kaldor (1970). Growth empirics up to the mid-1980s made extensive use of the neoclassical models. The notion of the endogenous new growth theory renewed the research interest in economic growth. The endogenous growth theory owes a great deal to the phenomenal works of Romer (1986) and Lucas (1988), which was supplemented by, among others, Grossman and Helpman (1991), Aghion and Howitt (1992), Romer (1993) and Coe and Helpman (1995). Based on Arrow's (1962) learning by doing the endogenous growth theory proposes a macro-dynamic theoretical construct to explain the effects of trade policies alongside capital flows and transfer of ideas and technology on the growth rate of income. Thus, development policies and the shifts in these policies have been formally recognized as arguments of the growth equation.

Neither the neoclassical theory nor the endogenous theory recognises the role of the 'extrinsic' or the 'sunspots' variables *vis-à-vis* the 'intrinsic' variables in economic growth. The extrinsic variables include the political variables such as democracy, government stability, political violence, political volatility, subjective perception of politics, frequency of armed conflicts, and corruption. Recent models of growth have emphasized that the growth performance of a nation may be affected by these parameters (see, for example, Brunneti, 1997). This paper aims at bringing in further empirical evidence concerning the role of these variables in economic growth. The paper particularly emphasizes on the role of 'polity' score, armed conflicts, and corruption by alternatively using cross-sectional data from 127 countries.

The rest of the paper is organised as follows. Section II reviews relevant literature on corruption, polity, conflict and economic growth; Section III presents the theoretical framework; Section IV illustrates empirical model, data and empirical results; and Section V concludes the study.

2.   A Brief Review of the Literature

The modern-day world has come off a long way from the organic view of the state in which the existence of the citizens and their activities would exclusively mean for the welfare of the 'state' rather than the citizens themselves. The role of the government has thus shifted from maintenance of law and order, and governance to enhancing the standard of living of the citizens. This is probably truer in

democratic societies where leadership is conferred by the mandates of the citizens. The perceived new role of the government apparently made it performance-oriented, the achievement of which is contingent upon the presence or absence of certain parameters. The set of parameters include, among other things, governance, political violence, political volatility, corruption, and armed conflicts.

By highlighting the role of the extrinsic variables, the contemporary growth literature brings to the front the *institution* view on economic growth. The role of institutions in economic development was emphasized by Lewis (1955) quite a long time ago. Some consider institutions as potential sources of differences in cross-country differences in growth [see, for example, North and Thomas (1973); Acemoglu *et al.* (2005)]. Rodik (2005) develops a four-cluster taxonomy of institutions that is vital to the study of economic growth. The taxonomy includes (a) market-creating institution that ensures the security of the property rights and enforcement of contracts; (b) marketing-regulating institution responsible for command and control; (c) market-stabilizing institution chalking out fiscal and monetary policies; and (d) market-legitimising institution that refers to the political regime that oversees the operation of the market. Thus, a clear synergy between economic institutions as embedded in the neoclassical theory, political institutions, and political regimes is now discernible.

The theoretical framework of the neoclassical growth theory has now become an integral element of macroeconomic textbook. And its empirical applications are well documented in the growth literature. This paper therefore avoids a review of the neoclassical theory. The literature on economic institution-growth nexus is still evolving. The literature in this area largely draws from the development of economic institutions in many European colonies in the past 500 years. These included the provision for private property, introduction and/or maintenance of extractive institutions, migration of the Europeans to sparsely populated regions, introduction of legal rights and the quality thereof in protecting the investors, among other issues. Empirical evidence, though not free from controversy, is indicative of a positive impact of economic institutions on economic growth. Acemoglu, Johnson and Robinson (2001, 2002) find positive effects of the development of private property and the introduction of extractive institutions in previously poor regions. Acemoglu (2001) finds that settlements of Europeans, as proxied by mortality rates 100 years ago, have no effect on per capita GDP today. However, mortality rates are likely to have contributed to the development of institutions that may affect growth. La Porta *et al.* (1997, 1998) show that the degree of investor protection as spelled out in the legal systems has implications

for the development of equity and stock markets. Better investor protection leads to greater debt and equity markets and also to better labour-market conditions, which in turn may contribute to growth (Botero et al., 2004). Deger, Lam and Sen (2011) find positive relationship between growth and economic institutions.

The theoretical underpinnings of extrinsic uncertainty or sunspot variables (or "animal spirits" or "market psychology" as they are alternatively known) to economic growth have been brought forward by Cass and Shell (1981, 1983). Cass and Shell (1983) argue that while extrinsic uncertainty does not matter in the static Arrow-Debru economy with complete markets, it may matter in overlapping-generations models under certain conditions. Further, in the presence of extrinsic uncertainty, equilibrium allocations are Pareto optimal in a 'weaker' sense', "which is appropriate to dynamic analysis". Bruneti (1997) has an extensive survey of the empirical literature concerning the effects of the sunspot variables on economic growth. The survey reviewed five categories of papers respectively concentrating on democracy, political volatility, government stability, political violence, and subjective political measures. Measures of political volatility and subjective political indicators have been found to have significant effects of economic growth followed by government stability and political violence. Democracy appears to have mixed results, and in most cases being unsuccessful in explaining economic growth. Deger, Lam and Sen (2011) find that political institutions 'including democracy' do not have any conclusive effects on economic growth.

3.   Theoretical Framework

The two-factor simple Cobb-Douglas output function can be written as

$$Y = AL^{\alpha}K^{\beta} \tag{1}$$

The basic factors of production, labour and capital positively affect economic growth with probably different size of contribution, namely, α and β respectively. There are also institutional and infrastructural advancements which are very influential factors for output growth. In equation (1) A represents the initial endowments of a country, thereby capturing the differences in productivity across countries. Besides, the literature also suggests a 'state capacity' variable in the growth equation, which also can be captured by A. Human capital is also one of the important determinants of economic growth (see, for example, Mankiw, Romer and Weil, 1992; Mankiw, Phelps and Romer, 1995). As representatives of the 'sunspots' or 'extrinsic uncertainty' variables, the present study includes corruption, armed conflicts, and non-democracy into the model. Accordingly, equation (1) has been revised as follows:

$$Y = AL^{\alpha}K^{\beta}H^{1-\alpha-\beta}E^{\delta} \; ; \; \alpha > 0, \beta > 0, \delta < 0 \qquad (2)$$

Testable specification of the model (by taking logarithm) can be given as follows:

$$lnY_{it} = \mu_i + \ln(A)_i + \alpha lnL_{it} + \beta lnK_{it} + (1-\alpha-\beta)lnH_{it} + \delta lnE_{it} + \varepsilon_{it} \qquad (3)$$

where, Y is output of country i at time t; μ is the country-specific effect; A is initial endowment of the country i; E is the vector of extrinsic uncertainty and ε is the error term.

4. Model, Data and Empirical Results

4.1 The Model and Data

The cross-sectional model uses the mean values of the variables. The specific empirical model for the cross-sectional results is as follows:

$$\dot{y}_i = (lnY_{i,t} - lnY_{i,t-1}) = \mu_i + \beta_1 lnY_{i,0} + \beta_2 lnL_{i,t} + \beta_3 lnK_{i,t} + \beta_4 lnH_{i,t} + \beta_5 NPI_{i,t}$$
$$+ \beta_6 Polity_{i,t} + \beta_7 C_{DUM} + \varepsilon_{i,t} \qquad (4)$$

Y_{it} is PPP-GDP (constant 2005 international \$) for each country over time, y_t is cross-sectional average growth of income, Y_{io} is initial income level. It may be noted here that data for PPP-GDP per capita are available from 1989 for most of the countries. For the rest of the countries in the sample, data are available from 1990 or from 1991. L is the labour force participation rate, K is gross fixed capital formation as percentage of GDP, H is human capital as proxied by the percentage of population attaining secondary education aged 25 and over), *Polity* is the average polity score, *NPI* is the average of non-corruption perception index, *C_Dum* is the conflict dummy, which takes a value of 1 if there is an incidence of conflict and 0 otherwise; and ε is error term.

Data on PPP-GDP, initial income, labour force participation rate, and gross fixed capital formation are sourced from the 'World Development Indicators' (WDI) of the World Bank. Data on human capital are taken from Barro and Lee database (2010) and WDI. Data on polity, corruptions and armed conflicts are compiled from Center for Systemic Peace and Center for Global Policy, George Mason University (April 30, 2010), Uppsala Conflict Data Program (1 August 2011); and Corruption Perceptions Index (various issues) of the Transparency International.

4.2 Description of the Variables

Since the extrinsic uncertainty variables are not widely known, a brief description of each of these variables is presented below.

Polity Score

'Polity', in the *Webster's New World College Dictionary* is defined as a "political or governmental organization; a society or institution with an organized government; state; body politic." In the 'polity' dataset, the polity scores take values within the range of -10 (strongly autocratic) to +10 (strongly democratic). However, we converted them into a range of 0 to 20, which facilitates the conversion of the variables into logarithmic form as required. We use the modified version of polity called 'polity 2'. The advantage of using polity2 is that it has converted some unusual scores such as -66, -77, and -88 into normal scores (-10 to +10) which, therefore, can be termed as standardized scores.

Non-Corruption Perceptions Index

According to the *Transparency International* (TI) (the Berlin-based anti-corruption nongovernmental organisation) 'corruption' is the abasement of entrusted power for private gain. The *Corruption Perceptions Index* (CPI), according to TI, is a "poll of polls". It shows the average scores which are the reflection of opinions by international businesspeople and financial journalists for individual countries. In CPI, countries are ranked according to the perceptions of corruption in the public sector. It is an assessment about corruption level at which it is perceived by businesspeople as impacting on their commercial life.

It is perceived that the greater the score is, the less corrupted the country would be. Therefore, although TI terms the corruption indicator as CPI, this study terms it as Non-Corruption Perceptions Index (NPI). Consequently, if corruption deters economic growth, we can expect a positive sign for the coefficient of the NPI variable. The NPI scores for different groups of countries are plotted in Figure 1. The more developed regions of the world appear to have higher scores.

Figure 1: Average NPI (2000-2010) across regions.
(Data source: Transparency International)
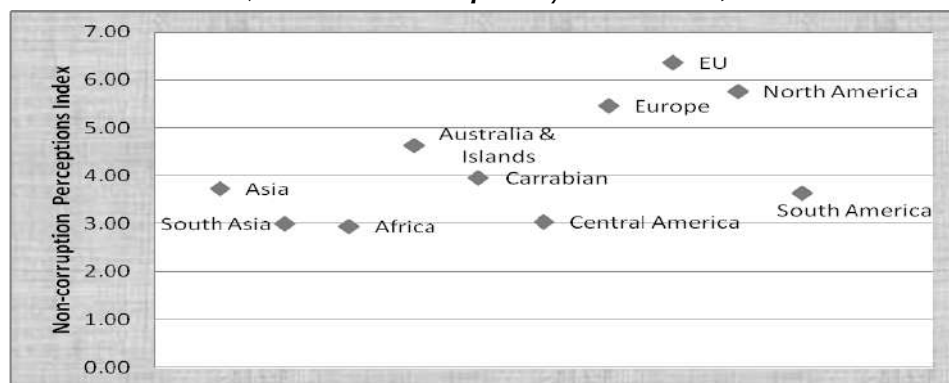
Armed Conflicts

In the UCDP/PRIO Armed Conflict Dataset Codebook the term 'conflict' has been defined as: "a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths." We collect the average of the annual number of battle deaths due to both internal and external conflicts. We construct a dummy variable for armed conflicts. A value of 1 for the dummy denotes the presence of armed conflicts and a value of 0 denotes otherwise. A distinctive effect of internal to external conflict is beyond the scope of this study. However, any further study may find this distinction interesting.

4.3 Empirical Results

Descriptive Statistics

The study uses 127 observations (the list of the countries is given in the Appendix) for the time period from 2000 to 2010. This is a cross-sectional study and we include average values of all variables except Y_{1989} and C_DUM. As mentioned earlier, Y1989 is PPP-GDP per capita, hence, it is a constant value of the mentioned year and C_DUM is a dummy variable. The world average of human capital is about 22 percent with a standard deviation of 15.67 percent, which indicates a large discrepancy between countries. Average polity score is about 14 out of 20 in the world. China's average polity score from 2000 to 2010 was 3, while its average GDP growth rate was 10.29 percent during the same period. Qatar's average polity score was 0 (zero), while the country's average GDP growth rate was 13.54 percent in the last decade. On the contrary, Portugal's average polity was 20 while the country's average GDP growth rate was less than 1 percent. A similar scenario is observed in many other countries. Consequently, it seems there is an inverse relationship between democracy and economic growth.

No country in the world is free from corruption. It's just a matter of degree. The average NPI score for the world as a whole is about 4 out of 10. With the highest NPI score of 9.52, Finland is the least corrupt country. Denmark (9.46), New Zealand (9.45), Singapore (9.28), Sweden (9.24) and Iceland (9.22) are the other less corrupt countries. With the lowest score of 1.7 Afghanistan and Bangladesh are the most corrupt-prone countries in the world. (Somalia and Myanmar have lower NPI scores than Afghanistan and Bangladesh. The two countries, however, are not included in the present study).

Table 1: Descriptive Statistics

	?Y	Y_{1989}	L	K	H	Polity	NPI
Mean	14549173653	8645.91	21500568.52	21.44	21.71	13.95	3.995
Median	2078924357	4714.89	4231411.06	21.22	18.37	16	3.17
Maximum	5.46078E+11	64828.61	758262206.8	39.48	74.1	20	9.52
Minimum	23225901.93	400.99	300610.46	8.86	0.67	1	1.7
Std. Dev.	54978134055	10223.18	78393041.18	4.73	15.67	6.04	2.07
Observations	127	127	127	127	127	127	127

Note: ΔY is growth of PPP-GDP (constant 2005); Y_{1989} is per-capita PPP-GDP in 1989; L is labour force, K is capital (% of GDP); H is human capital which is proxied by labour force with secondary education (% of population aged 25 and over); P is polity score; and NPI is non-corruption score.

Correlation Matrix

The correlation matrix (Table 2) shows that initial income and human capital as well as initial income and non-corruption scores are highly correlated. All other explanatory variables are insignificantly correlated with each other.

Table 2: Correlation Matrix

	$?\ln Y_i$	$\ln Y_{1989}$	$\ln F_i$	$\ln K_i$	$\ln H_i$	$\ln NPI_i$	$\ln Polity_i$	C_DUM
$?\ln Y_i$	1							
$\ln Y_{1989}$	0.47	1						
$\ln L_i$	0.78	-0.07	1					
$\ln K_i$	0.29	0.13	0.08	1				
$\ln H_i$	0.26	0.67	-0.10	0.19	1			
$\ln NPI_i$	0.33	0.76	-0.08	0.13	0.47	1		
$\ln Polity_i$	0.03	0.07	0.15	-0.02	0.13	0.22	1	
C_DUM	0.10	-0.37	0.36	-0.18	-0.29	-0.37	-0.05	1

Regression Results

The estimated regression results are presented in Table 3. In view of the strong correlation of human capital and non-corruption score with initial endowments, two alternative equations are estimated, with and without the initial endowments variable. Model 1 shows that the coefficient of polity score is statistically significant alongside initial endowments, labour force, and capital. A negative sign of the coefficient of the polity variable indicates that the greater the degree of democracy, the lower will be the growth rate. Human capital and corruption do not appear to have any significant effect on economic growth. Model 2

indicates that both polity and corruption variables have statistically significant effects on economic growth along with labour force, capital, and human capital. The polity variable still has a negative sign. A positive coefficient of NPI indicates that corruption is negatively related with economic growth. In both models, armed conflicts appear not to be a significant determinant of economic growth.

Table 3: Regression Results

	Model 1	Model 2
C	-4.19***	-0.04
	(0.92)	(1.10)
$\ln Y_{1989}$	0.77***	-
	(0.08)	
lnL	1.04***	1.08***
	(0.04)	(0.05)
lnK	1.28***	1.14***
	(0.22)	(0.30)
lnH	-0.03	0.36***
	(0.07)	(0.08)
lnNPI	0.16	1.37***
	(0.18)	(0.18)
lnPolity	-0.35***	-0.52***
	(0.08)	(0.10)
C_DUM	0.12	-0.02
	(0.13)	(0.17)
Adj. R^2	0.92	0.85
F^{STAT}	185.68***	109.78***
Observations	127	127

Note: *** stands for the level of significance at 1percent; Standard errors are in parentheses. Model1 includes all variables of our theoretical model (Equation 3). However, $\ln Y_{1989}$ is highly correlated with lnH, lnNPI and lnPolity; hence, we exclude the initial income variable from the regression equation (Model 2) to fix multicollinearity problem.

5.   Conclusion

The primary objective of the study has been to empirically estimate the effects of the extrinsic uncertainty variables on economic growth. In a cross-sectional study involving 127 countries, the study finds that democracy negatively affects economic growth, while polity has a positive impact. Armed conflicts do not appear to have any statistically significant effect on economic growth. The empirical results of this study are consistent with earlier findings.

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APPENDIX

List of Countries Included in the Sample

Afghanistan	India	Qatar
Albania	Indonesia	Romania
Algeria	Iran	Rwanda
Argentina	Ireland	Russia
Armenia	Israel	Saudi Arabia
Azerbaijan	Italy	Senegal
Australia	Jamaica	Sierra Leone
Bahrain	Japan	Singapore
Bangladesh	Jordan	Slovak Republic
Benin	Kazakhstan	Slovenia
Bolivia	Kenya	South Africa
Botswana	Kuwait	South Korea
Brazil	Kyrgyz Republic	Saudi Arabia
Burundi	Laos	Senegal
Cambodia	Latvia	Sierra Leone
Cameroon	Liberia	Singapore
Central African Republic	Lesotho	Slovak Republic
Chad	Libya	Slovenia
Chile	Lithuania	South Africa
China	Madagascar	South Korea
Colombia	Malawi	Spain
Costa Rica	Malaysia	Sri Lanka
Cote d'Ivoire	Mali	Sudan
DR Congo (Zaire)	Mauritania	Swaziland
Congo	Mauritius	Sweden
Croatia	Mexico	Switzerland
Denmark	Moldova	Syria
Dominican Republic	Mongolia	Tajikistan
Egypt	Morocco	Tanzania
El Salvador	Mozambique	Togo
Ecuador	Namibia	Thailand
Estonia	Nepal	Trinidad and Tobago
Ethiopia	Netherlands	Turkey
Fiji	New Zealand	Tunisia
Finland	Nicaragua	Uganda
France	Niger	Ukraine
Gabon	Norway	UAE
Gambia	Oman	UK
Georgia	Pakistan	USA
Germany	Panama	Uruguay
Ghana	Papua New Guinea	Venezuela
Greece	Paraguay	Yemen
Guatemala	Peru	Zambia
Guyana	Philippines	
Honduras	Poland	
Hungary	Portugal	