GROWTH AND INSTITUTIONS IN LATIN AMERICA: A POOLED AND CROSS-TIME SERIES ANALYSIS (1951-1999)*

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RESUMEN

Durante las últimas dos décadas, los economistas han desarrollado un mayor interés en la incorporación de las instituciones como una variable dentro de los modelos de crecimiento económico. Esta no es una tarea fácil. Es difícil generar los instrumentos que miden el desarrollo de las instituciones, las cuales se refieren a los diferentes problemas, tales como: inestabilidad política, el imperio de la ley, confianza, democracia y riesgo en los negocios.

El principal objetivo de este artículo es desarrollar un modelo de crecimiento para los países de América Latina, que no sólo incorpora las variables usuales, como la inversión, el capital humano, gasto público y comercio, sin que además, las variables puedan ser usadas como proxy de las instituciones para estos países, cubriendo el periodo de la segunda mitad del siglo XX. El énfasis está orientado a cuestiones empíricas antes que teóricas.

Los resultados muestran que las variables institucionales juegan un rol, pero debido a las limitaciones de los datos en el área de las variables no económicas y a la naturaleza de esta investigación, la evidencia es débil. Sin embargo, después de los años ochenta, parece haber evidencia empírica más fuerte sobre el rol de las variables no económicas en el crecimiento económico. El mérito de este trabajo es que es un intento inicial por construir tales modelos basado en series de tiempo de corte transversal y aplicado únicamente a América Latina. Usualmente, la mayoría de los modelos vistos son regresiones de corte transversal entre países. Algunas técnicas, que fácilmente se aplican en las regresiones de corte transversal entre países, son más difíciles en datos de corte transversal y análisis de serie de tiempo.

PALABRAS CLAVES: Colombia, crecimiento, instituciones.
CLASIFICACIÓN JEL: O43, O54.

ABSTRACT

During the last two decades, economists have developed more interest in incorporating institutions as a variable for economic growth models. Such a task is not an easy one. It is hard to generate instruments that measure the development of institutions that are referred to different problems such as political instability, rule of law, trust, democracy, business risk and the like.

The main objective of this paper is to develop a growth-model for Latin American countries that incorporates not only the usual economic variables, such as investment, human capital, government expenditure and trade, but also variables that can be used as proxies of institutions for these countries, covering the period of the second half of the twentieth century. The emphasis is more oriented to empirical issues rather than theoretical ones.

The results show that the institutional variables do play a role, but due to limitations of the data base in the area of non-economic variables and the nature of this research, the evidence is somewhat weak. However, after the 80s, there seems to be stronger empirical evidence about the role of non-economic variables in economic growth. One merit of this work is that it is an initial attempt to build such models based on pooled-cross-time series and applied only to Latin America . Usually, most of the models we have seen are just cross-country regressions. Some techniques that are easily applied in cross-country regressions are more difficult in pooled and cross time series analysis.

KEY WORDS: Colombia, growth, institutions.

JEL CLASSIFICATION: O43, O54.

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I. INTRODUCTION

During the last decade of the twentieth century the interest in the role of institutions in economic development has increased due to several factors like the continuous deterioration of economic growth in many African countries, the problems faced by Eastern European countries in their transition from socialism to market economies, and the frustrations that such processes have implied regarding

the expectations at the beginning of the 90s and the slow-down of economic reforms in Latin American during the second half of the last decade as these countries experienced few positive results with the implementation of such policies.

These realities have generated an increased interest in incorporating institutions as a variable in models of economic growth, although such task is not an easy one. To be sure, in order to include institutions in a model, it is necessary to design appropriate instruments that will allow us to measure the impact and evolution of different factors like political instability, rule of law, trust, business risk and the like.

Through this paper we take a first approach to such purpose and attempt to develop a growth-model for Latin American countries that incorporates not only the usual economic variables such as investment, human capital, government expenditure, and trade but also variables that can be used as proxies of institutions covering the period from 1951 to 1999.

The first section develops some theoretical considerations regarding the results that the current literature has registered for similar models that try to incorporate some institutional variables. However, the emphasis of this paper is more empirical than theoretical, and is oriented to underline the problems that arise from the estimation process.

In the second section we set up the model, define the variables and econometric procedures and techniques applied. Next, we devote some time to discuss the data, and how we used it, and elaborate on the adjustments we had to make, the difficulties we faced when solving some problems and also, the limitations of the scope of the model. We continue with an interpretation of the results and offer some conclusions at the end.

The results show that institutional variables do play a role, but because we were not able to get complete data bases in the

area of non-economic variables and the nature of this research, the evidence is still preliminary. Anyway, we claim that one of the merits of this work is that it is an initial attempt to build a model that incorporates institutions in its analysis applied with a particular focus on Latin America and that uses time series analysis. Usually, most of the models we have seen are just cross-country regressions[1]. Some techniques that are easily applied in cross-country regressions are more difficult in pool and cross time series analysis.

II. SOME THEORETICAL CONSIDERATIONS

Despite the new developments during the last twenty years incorporating the ideas of human capital, endogenous growth models and learning by doing approach[2], current growth models are mainly based on the older neoclassical Solow-Swan model. As Barro (1996, 145) points out, "despite many breakthroughs …the recent empirical work on growth across countries and regions has not received its main inspiration from new theories. Rather, the standard applied framework derives more from the older, neoclassical model, as extended to include…other variables".

Through time, the concern for economic growth has pervaded through different economic theories. Classical economists revealed the link between economic growth and the distribution of surplus into profits and rents. For Karl Marx the rate of economic growth depended on a set of variables, especially the rate of profit. Post-Keynesian economists underlined the role of the expansion of

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[1] An exception to this assertion is the recent paper by Kruzman, Ch., Werum, R. and Burkhart, R.(2002) that works with "core" and "non-core" countries though not referring to a specific region such as Latin America.

[2] A complete review of the main standard neoclassical models by Solow and Swan can be seen in Barro, R. and Sala-I-Martin, X. (1998), chapters 1-2.

demand as a main source of growth, underpinning processes of increasing returns of scale, cumulative processes and self-reinforcing mechanisms[3]. Also, the idea of endogenous technological progress as an engine of economic growth is found in Smith, Marx, Schumpeter and Kaldor. Later, under a neoclassical perspective, Lucas and Romer would include the human capital approach.

However, from an empirical standpoint, most current models of growth have been based on the neoclassical approach built on the assumption of diminishing returns to capital. These models combine the standard variables with ideas of diffusion of technology, learning by doing and other issues. However, one of the main results of the standard neoclassical growth model always remains: the hypothesis of *conditional convergence,* which helps to explain the apparent irregularity of lack of correlation between economic growth rates and per-capita incomes of countries. Once the initial per-capita income for each country is taken into account, the results improve considerably regarding the significance of the main variables. The hypothesis of conditional convergence is referred to as a process of convergence to a specific long-run steady state for each country. (Barro 1997, 7-8).

Barro has explored the role of institutions worldwide in cross-country analyses. For example, he finds that measures of political instability "no longer affect growth significantly once an indicator of the security of property rights is held constant" (Barro, 1996b, 146). In another study, he also points out that the maintenance of the rule of law, free markets, small government consumption and high human capital, seems to play an important role in economic growth (Barro 1996a, 23).

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[3] A brief summary of growth theories can be read on O'Hara, Philip (1999), p.241-245.

However, despite the traditionally good results with the standard neoclassical growth model, some empirical evidence has been gathered to show that many poor countries do not seem to be catching up with other middle and high per capita income countries (Temple, 1999, 117)[4]. For this reason, many scholars have started to focus their attention on the problem of the role of institutions in economic growth in order to determine if the "quality of public and private institutions, the particular structure of governance, and the extent of social capital (or civic engagement) affect growth" (Aron, 2000, 99).

Though since the beginning of the twentieth century Original Institutional Economics (Veblen-Ayres-Commons's tradition) insisted on the important role of institutions in economic performance, it is the New Institutional Economics (NIE) that has been more known for developments regarding this theoretical issue. The work of Douglass North has focused extensively on this subject (Libecap, 1990), where informal and formal rules seem to have played a crucial role in economic development as well as in the chronic backwardness of many countries[5].

Recent works on economic growth and institutions show that one of the main problems is to find good proxies for the concept of institutions. To be sure, one has to be aware that such a complex concept is very difficult to reduce to some empirical indicators such as the positivist approach would demand. These quality measures for formal and informal institutions usually include respect for contracts, property rights, trust, and civil liberties.

A good attempt was made recently by Hodgson (2006) studying the case of transitional economies in Europe (1989-2005)

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[4]   This fact does not deny the hypothesis of conditional convergence, which refers to a different problem.
[5]   See also recent works by Rodrik (1999).

from an institutionalist and evolutionary perspective showing that the degree of ethnic fractionalization, index of democracy and cultural factors such belonging or not to the zone of Western Christendom seem to be more significant than others.

Although from different perspectives, several political and social databases have been constructed in the last decade to deal with this problem. However, when the researcher tries to work with long time series, only with some exceptions, she (he) is able to get information before the eighties. Many indexes or qualitative measures created for this kind of variables still have problems even though they have improved considerably (Aron, 128-130).

Despite these limitations, some solid results been obtained from numerous growth models built with institutional variables. For example, Mauro (1995) finds significant evidence of a negative correlation between corruption and investment, and is able to argue that bureaucratic efficiency seems to be an important determinant for investment and economic growth. Knack (1996) finds that low-quality institutions become a handicap for economy growth, even though some 'backwardness' could be beneficial at the beginning of the process of economic growth, when the nation has favorable institutions (Greece, Spain, and Ireland). In addition, Temple (1999) concludes that "democracies do not do noticeably better than autocratic regimes, but countries that extend economic freedoms and protect property rights grow faster" (152). Also, Borner et.al. (1995) state, upon reviewing sixteen empirical studies, that only three found a positive association between democracy and economic growth, another three uncovered a negative relationship, and the remaining ten had inconclusive findings.

A quick review of the literature on the relationship between democracy and economic growth shows that there are several studies that consider how growth, or the lack thereof, affects the chances for democratization or democratic consolidation (Przeworski, et.al. 1996, Haggard and Kaufman 1997), but only recently there

are some studies that analyze the inverse relationship, this is, how democracy affects growth (Rodrik 2000, Gasiorowski 2000, Tavares and Wacziarg 2001, Bueno de Mesquita et.al. 2001). To be sure, in 1990 Terry Lynn Karl called for reconsideration of the analysis by saying:

> … [W]hat the literature has considered in the past to be the preconditions of democracy may be better conceived in the future as the outcomes of democracy. Patterns of greater economic growth and more equitable income distribution, higher levels of literacy and education, and increases in social communication and media exposure may be better treated as the products of stable democracies processes rather than as the prerequisites of its existence" (p.5).

Other scholars have identified that a *degree* of wealth or capitalist development is required for democracy. In order for a country to institutionalize democratic procedures and behaviors, it is necessary for its economic performance to cross a threshold (Karl 1990, Przeworski et.al, 1996)) or as Lipset (1959) puts it, "the more well-to-do a nation, the greater the chances that it will sustain democracy". However, Lipset´s argument is turned around by O´Donnell (1973) and Huntington´s (1984) view, that as economies become more complex, developed and influenced by foreign capital and technology, supported by low wages and low social investment, democratic processes and actors (i.e. trade unions and political parties), tend to be replaced by a professional military, and by technocrats and managers that assume the decision-making process.

As we mentioned before, one of the main difficulties we found when creating a model that incorporates political institutions into the analysis is how to operationalize and measure democracy, and other political variables. In this matter, Bueno de Mesquita, et.al. (2001),

attempt to introduce two new concepts or institutions to identify political competition: electorate and winning coalitions. According to the authors, political competition generates economic growth but politicians are faced with a paradox as they have to decide between policies that benefit popular welfare and policies that will grant them more time in office[6]. The authors´ work attempts to develop a "theory that ties political incentives to the interest that leaders have in staying in office", and they try to determine how political institutions affect decisions about government allocation of resources (58).

Based on their study, Bueno de Mesquita et.al. (2001) reaffirm that economic growth is affected by the type of government a country has. They found that two countries that start at the same per-capita income in 1950 will have a very different per-capita income in 2000 if they have different forms of government. The country with an autocracy will have a per-capita income of $1,200 while the one with a democracy or from a large coalition will have $4,480. They go even further by saying that if both countries remain with the same form of government until 2050, the gap will be wider: the country under an autocracy will have a per-capita income of $2,910 and the one with democracy will have $10,035 (65-66).

Similarly, Kurzman, Werum and Burkhart (2002) used a pooled annual time-series data from 1951-1980 for 106 countries, including 88 non-core countries, finding little or no direct effects of democracy on growth. However, positive indirect effects appear via investment (marginal but significant) and a robust effect via government expenditure, They, therefore, conclude that democracy does not hinder economic growth, and under some specific circumstances seems to foster it.

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[6]   Barbara Geedes refers to this as "The politicians Dilemma".

III. **THE MODEL**

Most growth models are inspired by a classical production function such as[7]:

$$Y = A f (K, L, H) \hspace{3cm} (1)$$

Where Y = Real output
A =index of technical efficiency
K = capital
L =labor
H = Human capital

If we take logs and differentiate with respect to time, dividing both sides by Y, and defining the steady state for the model, we end up with the usual expression for all growth models:

y = g (investment coefficient, labor growth, human capital growth, growth residual)
Where y= real growth of output per capita.

The estimations based on private investment coefficients, proxies for labor and human capital have been straightforward, but most of the discussion has centered on the residual, where we find a set of variables that incorporate technical change, political and social institutions and other variables.

Taking into account the limitations on information we had, we defined the model as follows:

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[7] The following is a simplified version of the Mankiew-Roemer-Weil model. See Temple (1999, 122).

$$RGDP_{it} = \beta_0 + \beta_1 I_{it} + \beta_2 G_{it} + \beta_3 OPEN_{it} + \beta_4 INFLATION_{it}$$
$$+ \beta_5 POPGROWTH_{it} + \beta_6 LRGPL50_{it} + \beta_7 LNSECEN60_{it}$$
$$+ \beta_8 BLACKMP_{it} + \beta_9 DEMOCRACY_{it} + \beta_7 RIOTS_{it} + \beta_8$$
$$CONSTCH_{it} + \varepsilon_{itit} \hspace{2cm} (3)$$

Where:

i = Country (a member of a subset of Latin American countries)

t = Year (from 1951 to 1999)

RGDP = Annual growth rate of Real Gross Domestic Product per capita

I = Coefficient of private investment (Priv. Inv / GDP)

G = Coefficient of Central government expenditure (Gov. Consumption / GDP)

OPEN = Trade coefficient ((Exports+Imports)/ GDP)

INFLATION = Annual change in consumer price index

POPGROWTH = Growth rate of population

LRGPL50 = Log of Real GDP per capita in 1950

LNSECEN60 = Log of Secondary Education Enrollment rate in 1960

BLACKMP = Black market premium of the exchange rate

DEMOCRACY = An index for democracy [0,1,…10].

RIOTS = Number of riots involving more that 100 people.

CONSTCH = Changes made to the Constitution

ε= random error

Several considerations have to be made with respect to the specification of the model:

1) We were not able to include some political and institutional variables. For example an index of business risk was not included because it is only available from private sources at a specific price. In addition, an index for the rule of law, which

is important for our model, is not available in time series; it is only useful for cross-country studies (Knack, 1996).

2) There has been enough empirical evidence of the endogeneity of private investment (I) and an obvious solution for this problem is the use of instrumental variables. Barro (1997) has used different specifications to solve this issue with some positive results in cross-country studies. The problem, however, is that for this variable there is a lack of good instruments. Moreover, in pooled and cross time series, one runs into software limitations to handle the problem[8].

3) OPEN tries to reflect the role of trade in development; INFLATION tells us something about the macro-stability conditions of the economy, and it is expected to be harmful for economic growth; and POPGROWTH has been assumed to be negative for economic growth.

4) LRGPL50 and LNSECEN60 are control variables for the initial levels of GDP and education. These variables are necessary to guarantee conditional convergence. We expect β to be negative (the higher the initial level of output and education, the closer it is the economy from the steady-state growth rate).

5) BLACKMP accounts for exchange control systems, inefficiencies and corruption in the trade system of the economy. It picks some of the institutional problems at an economic level.

6) DEMOCRACY is an important index that many scholars have found relevant for economic growth. Barro (1996a, 1997) finds a quadratic expression for democracy that is explored in this paper. The idea is that democracy is good for growth

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[8] Obviously the code would result very complicated. This issue is left for further research.

but excessive democracy can also hinder economic growth (Barro 1996a, 1997). See above for other arguments.

7) RIOTS and CONSTCH were included to address some problems of institutional instability.

8) Another limitation of the model is that it was impossible to obtain consistent and continuous data for a proxy for investment in human capital, such as Expenditure in Education/GDP.

Given the structure assumed for ε_{it}, we used two estimation procedures:

a) The Parks method assumes a first-order autoregressive structure with contemporaneous correlations between the cross sections. The errors can be heteroskedastic within the same cross section, contemporaneously correlated across sections within the same time observation, and follow an AR (1) process.

Analytically,

$$E\,(\varepsilon^2_{it}) = \sigma_{it}$$

$$E\,(\varepsilon_{ij\varepsilon}\varepsilon_{ij}) = \sigma_{ij}$$

$$\varepsilon_{ij} = \rho_i\varepsilon_{i,t-1} + \mu_{it}$$

b) The Fuller and Batesse method is basically the panel-error component model, where the disturbance is formed by three independent components, one associated with time, another with the cross sectional unit, and the third varying in both dimensions[9]. Hence, $\varepsilon_{it} = \mu_i + \upsilon_t + \omega_{it}$ where ε, μ, ω follows

a normal distribution $\eta\,(0, \sigma)$ with the classical assumptions, and are independently distributed.

The usage of the error component model derived from criticisms of the Park method because of bias in standard errors and t-statistics in the case of small samples (Beck and Katz, 1995). Both methods are used here.

IV. **THE DATA**

The data was taken from different sources: a) For the period 1950-1992, for a set of variables such as OPEN, I, G, the data was taken from the Penn World Tables (Summers and Heston, 1991). The information was downloaded from the Center for International Development at Harvard University[10]. The Real GDP per capita is given in US dollars of 1985 based on international prices (Laspeyres Index). RGDP was calculated taking differences of the logs. b.) For the period 1993-1999 the information was completed using the database of Easterly and Sewadeh at the World Bank[11], which provides broad information on Macro-Time Series, Micro-Time Series, Government Finance and Social indicators. Information on education, population and BPM was also taken from there.

Initially the intention was to include all countries of Latin America, but the information for most of the Caribbean islands was incomplete. Only Haiti and the Dominican Republic remained. Cuba was excluded because there is no information at all. Hence, our final sample was reduced to continental countries, excluding Belize and

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[9] An explanation of both methods can be seen in K-Menta, J. (1986). Ch.12.

[10] The precise site is http://paradocs.pols.columbia.edu/

[11] This data base can be seen at http://www.worldbank.org/research/growth/ GDNdata.htm

Guyana, which also presented information problems. At the end, we ended up with 17 countries, covering 49 years (See Appendix).

Some information for specific years was incomplete. We had to calculate some of the data by using several issues of the International Financial Statistics of the IMF, some of them from the 50s or the end of the 90s, calculations were made to estimate missing values.

The political variables presented a major obstacle. Most of this information is given for a few years, which is useful for cross-country studies but not for pooled cross-country analysis. We selected the variables available and discarded the ones that lacked consistency. Those that we kept were taken from the database of the Polity IV-Project of the CIDCM of the University of Maryland[12], created by Marshall and Jaggers. Within these we included the index of democracy as a measure of the degree of civil rights and political liberties present in a country.

The information for the rest of the political variables was taken from Easterly and Levine, also from the Center of International Development (CID) at Harvard University. Although there seems to be a database for an index of Rule of Law and for Business Risk Indicators, we did not include it because of its cost. We acknowledge this to be an important limitation for our project and hope to be able to use this database in the future.

V. ECONOMETRIC RESULTS

The model defined in (3) was run, using the TSCS procedure in SAS. Different specifications were explored, and different time periods were used. The first set of models was run for the whole period from 1951 to 1999. The second model was run only for the period 1980-1999 using the same variables from which we were

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[12] See http://www.bsos.umd.edu/cidcm/polity/

able to get all the information needed; the idea was to check for changes in the final period due to the extensive time period of the first model. Finally, a third model was run, for the period 1961-1989, based on the availability of the variables.

A. MODEL 1 (1951-1999)

Dependent Variable: GRGDP GRGDP
Estimation Method Fuller

Number of Cross Sections	17
Time Series Length	49

Fit Statistics

SSE	1.5815	DFE	82
MSE	0.0019	Root MSE	0.0438
R-Square	0.0879		

Variance Component Estimates

Variance Component for Cross Sections	0.000021
Variance Component for Time Series	0.000289
Variance Component for Error	0.001914

Hausman Test for Random Effects:

DF	m Value	Pr > m
7	13.65	0.0577

PARAMETER ESTIMATES

MODEL 1 – Estimation Method Fuller

1951-1999

Variable	DF	Standard Estimate	Error	t Value	Pr > |t|
Intercept	1	0.080436	0.0425	1.89	0.0585
I	1	0.002155	0.000341	6.32	<.0001
G	1	-0.00088	0.000390	-2.26	0.0242
OPEN	1	-0.00008	0.000064	-1.24	0.2137
INFLATION	1	-9.05E-6	2.258E-6	-4.01	<.0001
POPGROWT	1	0.001616	0.00296	0.55	0.5851
LRGDPL50	1	-0.01422	0.00637	-2.23	0.2458
LNSECENR60	1	0.007871	0.00672	1.17	0.2420

Estimation Method: Parks

Fit Statistics

SSE	824.5709	DFE	825
MSE	0.9995	Root MSE	0.9997
R-Square	0.0775		

PARAMETER ESTIMATES

MODEL 1 – Estimation Method Parks

1951-1999

Variable	DF	Standard Estimate	Error	T Value	Pr > |t|
Intercept	1	0.059669	0.0402	1.48	0.1381
I	1	0.00202	0.000309	6.54	<.0001
G	1	-0.00085	0.000411	-2.07	0.0384
OPEN	1	-0.00009	0.000050	-1.75	0.0808
INFLATION	1	-5.92E-6	2.214E-6	-2.67	0.0077
POPGROWTH	1	0.002436	0.00238	1.02	0.3057
LRGDPL50	1	-0.01222	0.00598	-2.04	0.0412
LNSECENR60	1	0.009228	0.00553	1.67	0.0953

These results clearly show that I (private investment/GDP) was very significant; even though it is affected by problems of endogeneity. One is not sure if investment is driving growth or the other way around. G (government consumption/GDP) was significant with the expected sign. OPEN shows the wrong sign and is not significant using Fuller. POPGROWTH was not important and the initial level of GDP per capita is significant with the expected sign (negative). Except for OPEN, the results are consistent with the growth literature. The control variable for education was not significant. Inflation rates were significant and gave the correct sign (negative).

In the next specification we include DEMOCRACY as an independent variable. A quadratic expression following Barro (1997) is explored.

Estimation Method Fuller

R-Square	0.0887
Variance Component for Cross Sections	0.000027
Variance Component for Time Series	0.000287
Variance Component for Error	0.001911

PARAMETER ESTIMATES
MODEL WITH DEMOCRACY
ESTIMATION METHOD FULLER

Variable	DF	Standard Estimate	Error	T Value	Pr > |t|
Intercept	1	0.079875	0.0440	1.82	0.0696
I	1	0.002218	0.000347	6.39	<.0001
G	1	-0.00086	0.000395	-2.17	0.0306
OPEN	1	-0.00008	0.000065	-1.30	0.1945
INFLATION	1	-9.13E-6	2.264E-6	-4.03	<.0001
POPGROWTH	1	0.001488	0.00304	0.49	0.6248
LRGDPL50	1	-0.01398	0.00661	-2.12	0.0347
LNSECENR60	1	0.006424	0.00719	0.89	0.3721
DEMOCRACY	1	0.000423	0.000540	0.78	0.4341

Estimation Method: Parks

R-Square   0.0778

PARAMETER ESTIMATE

MODEL WITH DEMOCRACY

ESTIMATION METHOD PARKS

Variable	DF	Standard Estimate	Error	t Value	Pr > |t|
Intercept	1	0.057994	0.0405	1.43	0.1529
I	1	0.002036	0.000312	6.53	<.0001
G	1	-0.00082	0.000415	-1.99	0.0474
OPEN	1	-0.00009	0.000050	-1.81	0.0700
INFLATION	1	-5.99E-6	2.203E-6	-2.72	0.0067
POPGROWTH	1	0.002539	0.00248	1.02	0.3061
LRGDPL50	1	-0.01201	0.00603	-1.99	0.0467
LNSECENR60	1	0.008909	0.00589	1.51	0.1308
DEMOCRACY	1	0.000103	0.000434	0.24	0.8130

Now, we explore the use of a quadratic expression for DE-MOCRACY:

Fuller and Battese Method Estimation

SSE   1.5733   DFE   823

MSE   0.0019   Root MSE   0.0437

R-Square   0.0900

Variance Component Estimate

Variance Component for Cross Sections   0.000031

Variance Component for Time Series   0.000293

Variance Component for Error   0.0019

DFm Value Pr > m

9 16.83   0.0515

PARAMETER ESTIMATES

MODEL WITH QUADRATIC EXPRESSION FOR DEMOCRACY

ESTIMATION METHOD FULLER AND BATTASE

Variable	DF	Standard Estimate	Error	t Value	Pr > |t|
Intercept	1	0.08158	0.0451	1.81	0.0707
I_	1	0.002349	0.000363	6.47	<.000
G_	1	-0.00084	0.000397	-2.11	0.0353
OPEN	1	-0.00009	0.000066	-1.34	0.1808
INFLATION	1	-9.08E-6	2.264E-6	-4.01	<.0001
POPGROWTH	1	0.001032	0.00313	0.33	0.7415
LRGDPL50	1	-0.01355	0.00678	-2.00	0.0460
LNSECENR60	1	0.004519	0.00756	0.60	0.5499
DEMOCRACY	1	-0.00144	0.00192	-0.75	0.4524
DEM2	1	0.000224	0.000218	1.03	0.3049

Parks Method Estimation

SSE	822.7697	DFE	823
MSE	0.9997	Root MSE	0.9999
R-Square	0.0773		

PARAMETER ESTIMATES

MODEL WITH QUADRATIC EXPRESSION FOR DEMOCRACY

ESTIMATION METHOD PARKS

Variable	DF	Standard Estimate	Error	t Value	Pr > |t|
Intercept	1	0.05579	0.0410	1.36	0.1735
I_	1	0.002075	0.000323	6.42	<.0001
G_	1	-0.0008	0.000417	-1.92	0.0558
OPEN	1	-0.00009	0.000049	-1.84	0.0657
INFLATION	1	-5.83E-6	2.197E-6	-2.65	0.0081
POPGROWTH	1	0.002473	0.00259	0.95	0.3408
LRGDPL50	1	-0.01131	0.00611	-1.85	0.0644
LNSECENR60	1	0.007679	0.00633	1.21	0.2257
DEMOCRACY	1	-0.00099	0.00162	-0.61	0.5392
DEM2	1	0.000128	0.000176	0.73	0.4666

From these two tables we may deduce that none of the specifications of DEMOCRACY seems to play a role in economic growth, worsening the result for the quadratic specification. This result is not a surprise. From several studies, it has been found that a quadratic behavior of Democracy is only valid in cross-country studies all over the world, where you have more variation in the variables Growth and Democracy. This is not the case for Latin America, where there are similarities in the evolution of Democracy and one cannot expect any kind of quadratic expression. Moreover, a Lagrange Multiplier test was performed to check the relevance of DEM2, giving negative results[13]. In addition, a dummy variable was used for bigger countries such as Argentina, Brazil, and Mexico, and the results were not significant. Using Parks, the t-statistic of the dummy was 1.35, and as expected with Fuller, it was .22.

B. MODEL 2 (1980-1999)

Model 1 was run for the period 1980-1999. For model 2 we include BLACKMP, with the purpose of exploring these parameters for a different period of analysis, especially, when Latin America was affected by the debt-crisis and orthodox policies began to be applied.

The results were the following:

Estimation Method		Fuller	
Number of Cross Sections		17	
Time Series Length		20	
SSE	0.6751	DFE	330
MSE	0.0020	Root MSE	0.0452
R-Square			0.1002

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[13] For both Fuller and Parks the Lagrange Multiplier was 2.6389 and 1.020, respectively. Both are less than $\chi_{(1),.95} = 3.841$

Variance Component for Cross Sections   0.000057
Variance Component for Time Series   0.000351
Variance Component for Error   0.002028
Hausman Test for Random Effects
    DFm Value Pr > m
    7   9.91   0.1939

Estimation Method Park

PARAMETER ESTIMATES

MODEL 2 - ESTIMATION METHOD FULLER

Variable	DF	Standard Estimate	Error	t Value	Pr > |t|
Intercept	1	0.138712	0.0899	1.54	0.1238
I_	1	0.000967	0.000387	2.50	0.0129
G_	1	-0.00103	0.000588	-1.76	0.0796
OPEN	1	-0.00003	0.000081	-0.36	0.7173
INFLATION	1	-9.61E-6	2.366E-6	-4.06	<.0001
POPGROWTH	1	-0.00823	0.00578	-1.42	0.1557
LRGDPL80	1	-0.01811	0.00893	-2.03	0.0435
LNSECENR80	1	0.005808	0.0108	0.54	0.5908
DEMOCRAC	1	0.002356	0.000919	2.56	0.0108
BLACKMP	1	1.63E-7	9.887E-7	0.16	0.8691

Estimation Method Park

PARAMETER ESTIMATES

MODEL 2 - ESTIMATION METHOD PARK

Variable	DF	Standard Estimate	Error	t Value	Pr > |t|
Intercept	1	0.085244	0.0279	3.06	0.0024
I_	1	0.001183	0.000099	11.93	<.0001
G_	1	-0.00134	0.000240	-5.58	<.0001
OPEN	1	0.000082	0.000025	3.27	0.0012
INFLATION	1	-8.72E-6	7.503E-7	-11.62	<.0001
POPGROWTH	1	-0.00917	0.00200	-4.59	<.0001
LRGDPL80	1	-0.01233	0.00349	-3.53	0.0005
LNSECENR80	1	0.006478	0.00427	1.52	0.1304
DEMOCRAC	1	0.002681	0.000361	7.42	<.0001
BLACKMP	1	1.076E-6	6.126E-7	1.76	0.0800

As usual, I, G, INFLATION, and LRGDPL80 are significant. In Park, trade is now more relevant, as are Democracy, POPGROWTH and BLACKMP (with the wrong sign). This seems to suggest that imposing an AR (1) structure in the random error makes a difference, compared with Fuller. However, due to the fact that the sample is smaller compared with Model 1, we prefer the Fuller estimates.

C. MODEL 3 (1961-1989)

The idea here is to include a set of additional political variables for which we were able to find information. One country was excluded because of data limitations. The results were the following:

Estimation Method   Fuller

Number of Cross Sections   6
Time Series Length   29

R-Square   0.1454
Variance Component for Cross Sections   0.000026
Variance Component for Time Series   0.000341
Variance Component for Error   0.001969
Hausman Test for Random Effects

DFm	Value	Pr > m
8	16.51	0.0357

PARAMETER ESTIMATES

MODEL 3 - ESTIMATION METHOD FULLER

Variable	DF	Standard Estimate	Error	t Value	Pr > |t| Label
Intercept	1	0.174753	0.0529	3.30	0.0010
I_	1	0.00307	0.000491	6.26	<.0001
G_	1	-0.00162	0.000498	-3.24	0.0013
OPEN	1	-0.00006	0.000160	-0.39	0.6978
INFLATION	1	-9.69E-6	2.796E-6	-3.47	0.0006
POPGROWTH	1	-0.0021	0.00452	-0.47	0.6417
LRGDPL61	1	-0.02697	0.00804	-3.35	0.0009
LNSECENR60	1	0.00992	0.0101	0.98	0.3273
DEMOCRACY	1	0.00064	0.000712	0.90	0.3689
RIOTS	1	0.000269	0.00119	0.23	0.8214
CONSTCH	1	-0.01366	0.0112	-1.22	0.2233

Estimation Method: Park

SSE	452.1537	DFE		453
MSE	0.9981	Root MSE	0.9991	
R-Square	0.262			

PARAMETER ESTIMATES

MODEL 3 - ESTIMATION METHOD PARKS

Variable	DF	Standard Estimate	Error	t Value	Pr > |t|
Intercept	1	0.155699	0.0276	5.65	<.0001
I_	1	0.003369	0.000363	9.28	<.0001
G_	1	-0.00189	0.000456	-4.13	<.0001
OPEN	1	-0.00009	0.000133	-0.64	0.5199
INFLATION	1	-6.26E-6	1.593E-6	-3.93	<.0001
POPGROWTH	1	0.001453	0.00319	0.45	0.6494
LRGDPL61	1	-0.02616	0.00483	-5.42	<.0001
LNSECENR60	1	0.00955	0.00780	1.23	0.2212
DEMOCRACY	1	0.000272	0.000461	0.59	0.5566
RIOTS	1	0.001863	0.000765	2.43	0.0153
CONSTCH	1	-0.03058	0.0110	-2.78	0.0056

From the results presented above we deduce that, again, I, G, INFLATION, LRGDPL61 are significant. Democracy is not significant, and Riots is significant only in Parks with the wrong sign. Constitutional changes seem to be more significant with the correct sign.

D. MODEL 4 (1984–1998)

Our last model includes additional institutional variables not included in the previous specifications due to limitations in the data set. However, these additional variables could be included only for the period 1984-1998 because the available data existed only for this time period[14]. The three new variables were:

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[14] Our acknowledgments to Danni Rodrik of the University of Harvard who diligently helped us with this data base obtained form the World Bank. International Risk Country Guide, 2002.

CORRUPTION (SCALE 0-6, where 0 represents the higher risk)

LAW AND ORDER TRADITION (0-6, where 0 is the higher risk)

QUALITY OF BUREAUCRACY (0-6, where 0 is the higher risk).

Estimation Method: Fuller

SSE	0.3470	DFE	228
MSE	0.0015	Root MSE	0.0390
R-Square	0.2304		

PARAMETER ESTIMATES

Variable	DF	Standard Estimate	Error	t Value	Pr > |t|
Intercept	1	0.271529	0.0968	2.80	0.0055
I_	1	0.002682	0.000729	3.68	0.0003
G_	1	-0.00092	0.000573	-1.61	0.1081
OPEN	1	-0.0001	0.000078	-1.22	0.2228
INFLATION	1	-9.6E-6	2.067E-6	-4.64	<.0001
POPGROWTH	1	-0.02105	0.00609	-3.46	0.0006
LRGDPL80	1	-0.02459	0.00976	-2.52	0.0124
LNSECENR80	1	-0.0149	0.0101	-1.47	0.1426
DEMOCRACY	1	0.001875	0.00102	1.83	0.0686
CORRUP	1	0.000113	0.00336	0.03	0.9732
LAW	1	0.005396	0.00351	1.54	0.1259
BUREACR	1	-0.00247	0.00392	-0.63	0.5288

Estimation Method :Parks

SSE	221.1632	DFE	228
MSE	0.9700	Root MSE	0.9849
R-Square	0.6979		

PARAMETER ESTIMATES

Variable	DF	Standard Estimate	Error	t Value	Pr > |t|
Intercept	1	0.264546	0.0519	5.10	<.0001
I_	1	0.002678	0.000243	11.02	<.0001
G_	1	-0.00119	0.000233	-5.09	<.0001
OPEN	1	-0.00011	0.000024	-4.57	<.0001
INFLATION	1	-8.85E-6	8.925E-7	-9.92	<.0001
POPGROWTH	1	-0.02111	0.00184	-11.44	<.0001
LRGDPL80	1	-0.02304	0.00767	-3.01	0.0029
LNSECENR80	1	-0.01589	0.00585	-2.72	0.0071
DEMOCRACY	1	0.002461	0.000461	5.34	<.0001
CORRUP	1	0.000154	0.00113	0.14	0.8922
LAW	1	0.006971	0.00115	6.08	<.0001
BUREACR	1	-0.00369	0.00121	-3.05	0.0026

The above results   are very consistent with many studies. Investment is highly significant with the correct sign, although affected by endogeneity. Public consumption expenditure (G) seems to harm economic growth. External trade does not seem to favor economic growth, a result contrary to standard neoclassical economics theory. Inflation and population growth hinder economic growth. The control level variables (Real GDP levels and human capital endowments) are significant with the correct sign. Now, the variables reflecting institutional arrangements such as democracy and rule of law seem to favor economic growth. Corruption does not appear to be relevant and the quality of public bureaucracy has the wrong sign.

These results are much better compared with previous models, indicating the fact that if social research continues to build data sets reflecting the role of institutions, the results are going to improve. During the last twenty years of the twentieth century economic growth of Latin American countries seems to be more affected by institutional variables.

VI. **CONCLUSIONS**

Some authors claim that the use of pooled cross time series analysis does not add much to the cross sectional analysis due to the influence of the business cycle in the data, although this problem is eliminated using averages of the variables in cross sectional analysis (Temple, 133). However, we argue that business cycles in developing nations are somewhat different from those in developed ones, which make those developing countries more affected by financial shocks and other problems. Moreover, this analysis will be stronger and richer, if we used all the information that complete time series can provide in panel data analysis.

In general, the results of this exercise for the case of Latin American seem to point out several conclusions. First, it is necessary to generate and improve the quality of social, institutional and political indicators in order to be able to capture the role of institutions in growth. The evidence obtained is somewhat weak, but not because the institutions are not there, playing an important role, but because many important variables as rule of law and business risk indicators as well as other relevant political variables as internal security, and political culture, were not included for the total period,

In addition, the hypothesis of conditional convergence is verified in all the regressions for the case of Latin America. The evidence about human capital regarding this convergence is weaker, though more solid for the last two decades of the twentieth century. Investment is the driving variable of growth and government consumption expenditure is harmful for economic growth. The evidence for open trade policies is not conclusive, contrary to what orthodox economic analysis assumes.

Also, there is no conclusive evidence that population growth is harmful for economic growth. Black market premiums seem to be inappropriate indicator of the inefficiency of government policies.

As for democracy, during the whole period it does not seem to be very important for economic growth. However, this does not mean that it does not play a role. We believe that this finding is affected by the difficulty in isolating its components with respect to the other variables. Contrary to what other researchers have found (Temple, 147), we did not find an important role for political instability in economic growth in the case of Latin America. But, on the other hand, continuous constitutional changes through political reforms or acts can be harmful for economic growth. During the last two decades, democracy and the rule of law seem to play a positive role.

In sum, there is still much to be done concerning the role of institutions in economic growth, as we were not able to determine a clear institutional effect because of the limitations of data resources. We encourage researchers to share and contribute to the discipline by making critical data available to the academic community, especially to scholars from developing countries where academic institutions have limited resources for research and development.

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APPENDIX

Latin American Countries included in the sample

Argentina	Colombia	México
Paraguay	Dominican Republic	Bolivia
Costa Rica	Nicaragua	El Salvador
Brazil	Ecuador	Panamá
Uruguay	Chile	Honduras
Perú	Venezuela	