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HOW MUCH DOES POLICY MATTER FOR GROWTH? EVIDENCE FROM A PANEL OF LATIN AMERICAN COUNTRIES

Abstract

This paper studies the effects of macro and political variables on real GDP growth in 17 Latin American countries for the period 1960-1990. I find that the augmented Solow model fits the Latin American data very well and the addition of the macro and political variables only marginally increases the explanatory power of the model. My results are quite different from those of Andrés et.al. (1996), who find that macro variables are important to growth in the OECD. Given that the factors important for growth are not the same for every region, I argue that large cross sectional studies looking for robust determinants of world-wide growth may be inappropriate.

Resumen

Este documento estudia los efectos de las variables macro y política en el crecimiento real GDP en 17 países Latinoamericanos durante el periodo de 1960-1990. Encuentro que el modelo aumentado de Solow fija datos de Latinoamérica muy bien y los adiciona de variables macro y política solamente marginalmente incrementadas por el poder aclaratorio del modeló. Mis resultados son completamente diferentes de los de Andrés y colaboradores (1996), quien encontró que estas variables macro son importantes para el crecimiento en la OECD. Dado que los importantes factores para el crecimiento no son los mismos para cada región, arguyo que los estudios de gran cruce seccional teniendo cuidado para robustecer las determinantes de crecimiento de amplitud mundial pueden ser inapropiados.

Introduction

The effect of macroeconomic and political variables on economic growth is an important unresolved issue. There is currently no consensus in the empirical literature on whether government consumption, inflation, openness, or political instability are robustly correlated with growth. Levine & Renelt (1992) examine the relationship between economic growth and a large number of macroeconomic and political variables and conclude that any relationship between the two is not robust to alternative specifications.[1]

One reason for the extended debate may be the fact that many of the studies use large cross-sectional regressions that inappropriately combine observations from large groups of disparate countries. The effect of inflation, government consumption, or political stability on growth is unlikely to be the same for the OECD as it is for Latin America or Africa.[2] To focus the study of macro variables and growth on a relatively homogeneous region, Andrés et.al (1996) study the effect of macroeconomic variables on real GDP growth in a pooled sample of OECD countries and find that medium-term macro variables are extremely important in the explanation of growth, even more significant than the accumulation variables from the augmented Solow model.

In this paper, I also limit the scope of countries being studied. I look at a panel of 17 Latin American countries for the period 1960-1990 to study what effect macro and political variables have had on growth in the region. [3] Unlike the findings of Andrés et.al. for OECD countries, my results show that the augmented Solow growth model does an excellent job of explaining growth in Latin America.[4] The only macro and political variables that are consistently significant are the growth of government consumption expenditures (as a % of GDP) and the variability of money growth. Trade variables, such as the growth of exports and imports, are found to be insignificantly related to real GDP growth. Some proxies for political instability are significantly related to economic growth when considered in isolation, but the results are not robust to alternative specifications.

Although the growth of government consumption and the variability of

[1] Sala-I-Martin (1994) contests the conclusion of the Levin & Renelt analysis, arguing that it is always possible to find variables that will eliminate the significance of macro variables in growth regressions.

[2] As a case in point, De Haan & Siermann (1996) find that political instability is significantly correlated with growth in Africa, but not in Latin America or Asia.

[3] One reason to think that there is something distinctive to the Latin American growth experience is that several studies report a negative and significant relationship between real GDP growth and a Latin American dummy (see Sala-I-Martin (1997), Alesina et.al. (1996), Barro (1990), and Mauro (1995)). To date, the only empirical investigation of growth in the region is by De Gregorio (1992), who considers a sample of 12 Latin American countries. This study expands the sample to 17 countries and investigates how well the augmented Solow model explains growth and whether the inclusion of macro and political variables can improve our understanding of the Latin American growth experience.

[4] The variables included in the augmented Solow model are: population growth, human and physical capital levels, and initial wealth.

money growth are significantly and negatively correlated with real GDP growth in the 1960-1990 period, the results also show that their quantitative contribution to growth is small. When the coefficients estimated from the augmented Solow model are used to predict real growth rates, I find that the augmented Solo model predicts growth nearly as well as the expanded model with the macroeconomic variables. This result is in direct contrast to Andrés et.al. (1996), who find that macroeconomic variables significantly increase the predictive power of the basic Solow model.

The results in this paper show that (1) the augmented Solow model does an excellent job of explaining growth in Latin America and (2) the inclusion of a various macroeconomic and political variables does not significantly increase the explanatory power of the basic model. Even the negative parts of my results are important because they, taken together with Andrés et.al., show that the factors important for growth may differ considerably from one region to another. Large cross sectional studies may create confusion in the literature about which factors are important for growth by inappropriately pooling countries from different regions.[5]

The paper is organized as follows. Section II reviews the literature on economic growth and macroeconomic and political variables. Section III discusses the data and the model, while Section IV looks at the results of estimating a simple regression using variables from the augmented Solow model and an expanded one that includes various macro and political variables. I also split the sample into 3 decades and looks at the effect of the macro and political variables in each time period. Section V provides a brief conclusion and talks about further extensions of the work.

I. The effect of macroeconomic and political variables on economic growth

While many articles find an empirical correlation between macro and political variables and real GDP growth, there is no consensus as to which variables are important and how much they can help to explain growth.[6] In this section, I briefly summarize the debate over the significance of various macro and political variables.

The relationship between government consumption and economic growth is still empirically indeterminant. Grier & Tullock (1989) and Grier (1997) both find a negative and significant correlation between the growth of government consumption expenditures and real GDP growth in the OECD. Barro (1989), using the level of consumption, also finds a negative relationship between government consumption and growth. Andrés et. al. (1996) find only a weak correlation

[5] Another problem in large cross sectional studies is the possibility of inappropriately pooling disparate countries. Grier (1998) and Grier & Tullock (1989) show that countries from Latin America, Asia, Africa, and the OECD do not share a common set of coefficients and large cross-sectional studies that pool coefficients from these groups may be biased.

[6] See Kormendi & Meguire (1985), Grier & Tullock (1989), Barro (1989), De Gregorio (1992,1993), Fischer (1991, 1993), Easterly (1993), Sala-I-Martín (1994), and Andrés et. al. (1996) among others.

between the level of government consumption and growth in the OECD and De Gregorio (1992) finds that government consumption is only significant when literacy rates are included in the regression. Levine & Renelt (1992) claim that the correlation between the level of government consumption and growth is non-robust to alternative specifications.

The empirical relationship between trade and economic growth is also unclear. [7] In a pooled sample of various OECD countries, Andrés et. al. (1996) find that export growth is the only trade variable robust to alternative specifications. Kormendi & Meguire (1985) and Levine & Renelt (1992) both report a positive, but non-robust, relationship between export growth and real GDP growth. De Gregorio (1992), in a study of 12 Latin American countries, shows that terms of trade, exports as a percentage of GDP, and an openness index created by the World Bank are all insignificantly correlated with real GDP growth. Harrison (1996) finds that only three of six openness variables are robust to specifications including policy variables.

The empirical literature on political stability and economic growth is similarly inconclusive. Most studies, such as Landau (1986), Skinner (1987), Londregan & Poole (1990), Barro (1991), Levine & Renelt (1992), Easterly et.al (1993), and Fedderke & Klitgaard (1998), measure instability with the number of coups or revolutions a country has experienced (either recently or in the past).[8] Others have used the change of government, or the probability of a change, to proxy political instability (see Grilli et.al (1991), Roubini (1991), Alesina et. al. (1996), Cukierman et. al. (1992), de Haan & Siermann (1996), and Fedderke & Klitgaard (1998)).

Landau (1986) finds a correlation between government stability and economic growth using annual data, but no correlation when the data is averaged into 4 and 7 year time periods. Similarly, Skinner (1987) finds that the relationship disappears when a variable representing taxes is included in the regression. Londregan & Poole (1990), Levine & Renelt (1992), and Easterly et. al. (1993) report an insignificant relationship between various measures of political instability and economic growth. On the other hand, Barro (1991), Alesina et. al. (1996), Cukierman et. al. (1992) and Barro & Lee (1993) find a negative and significant correlation between instability and real growth.

One reason that the literature on macro and political variables and growth is so contested may be the fact that many studies run cross-sectional regressions on a large number of disparate countries, possibly pooling countries that do not share a common set of coefficients. Grier & Tullock (1989) argue that it is necessary to test whether pooling is appropriate when you use repeated observations over a large group of countries, and show that countries from the OECD, Africa, Asia and the

[7] See Harrison (1996) for a good review of the literature on openness and growth.

[8] See Brunetti (1997) for an excellent summary of the literature on political instability and growth.

Americas do not share common coefficients. Grier (1998), in a paper showing that neither the OECD nor the Latin American growth experience can explain the high growth rates in East Asia, finds that the so-called tiger countries do not share a common set of coefficients with either OECD or Latin American countries.

As discussed in endnote #3, several recent empirical studies of growth include regional dummy variables in their regressions, in recognition that the explanation of growth in Africa or Latin America is most likely different than the explanation for the industrialized countries. However, if the slope coefficients differ across regions, intercept shifts will not correct the bias in the results. For this reason, I focus the study of the effects of macro and political variables on growth to the Latin American region.

Instead of pooling a large number of countries who do not share common coefficients (and then adding dummy variables to control for Latin American or African-specific problems), I look at the effects of macro and political variables on growth in Latin America.

II. Data and Variables

I calculate five year averages of annual data from 17 Latin American countries over the years 1960-1990, resulting in 6 observations for each country, and a sample size of 102 data points. [9] Averaging over five year periods, instead of over the entire sample, allows me to capture influences from both the differences between countries and changes over time.[10] I use feasible GLS with country specific serial correlation coefficients and error variances to estimate all the full sample regressions and OLS to estimate the decade regressions reported in Section V. The economic data is taken from the Penn World Tables and the IMF international financial statistics. Appendix 2 lists the variables and their sources.

The dependent variable for every regression is average real GDP growth. In the paragraphs below, I describe the variables from the augmented Solow model and the macroeconomic and political variables that are used as independent regressors in the paper.

A. The augmented Solow model:

(1) Initial income: The traditional neoclassical model argues that lower income countries will have higher growth rates than more developed countries (see Solow (1956), Dowrick & Nguyen (1989), Barro & Sala-i-Martin (1991). Following Romer (1987), Rebelo (1991), and Grier & Tullock (1989), I account for this in my model by using the initial level of per capita income for each five year

[9] I use all of the Latin American countries for which there is continuous data available. Appendix 1 lists the countries used in the paper.

[10] See Grier & Tullock (1989) for a justification of using a 5 year intervals instead of averaging over the entire sample.

period to explain subsequent growth rates.

(2) Labor force growth: The neoclassical model predicts a positive relationship between the labor force growth and income growth. While population growth is not equivalent to labor force growth, it has frequently been used as a proxy (see Kormendi and Meguire (1985) and Grier and Tullock (1989) and Grier (1997)). As the dependent variable is average real GDP growth (and not per capita growth), I expect to find a positive relationship between it and population growth.

(3) Investment: I use the level of investment (as a % of GDP) from the Penn World Tables to investigate the effect of investment on growth. The Solow model predicts a positive and significant relationship between investment and real GDP growth.

(4) Human Capital: To determine if human capital has played a major role in Latin American growth, I include a variable which represents the average number of years of secondary schooling in the population.[11] While the augmented Solow model (see Mankiw et.al. (1992)) predicts a positive relationship between human capital and real GDP growth, De Gregorio (1992) finds a negative and significant correlation between schooling and growth rates for 12 Latin American countries.

B. Economic policy variables

To investigate the relationship between government policy and economic growth in the region, I include the growth of government consumption expenditures, the growth of the money base, and the variability of money growth in my model. Grier & Tullock (1989), Grier (1997) both find a negative relationship between the growth of government consumption expenditures (as a % of GDP) and real GDP growth. I use the growth rate of government consumption spending (as a percentage of GDP) over each 5 year period to measure the influence of government policymaking on economic development.[12]

Kormendi & Meguire (1985) and Andrés et. al (1996) find a positive relationship between money growth and average real growth. Andrés et.al. (1996) also report a negative correlation between the variance of money growth and real

[11] The variable is taken from Barro & Lee (1994). I also used the average total years of education (from Kyriacou (1991) and found that the results are unchanged with respect to the education variable used.

[12] I use the growth of government consumption, instead of the level, to model the effect of government activity on economic growth. As Grier & Tullock (1989) argue, using the level of expenditures means that a one time change in government can have permanent effects on real GDP growth. They claim that increased government consumption is much more likely to temporarily affect growth, as agents react to the new intervention with different patterns of production and investment.

GDP growth, contrary to Levine & Renelt's (1992) claim that the relationship between the two is not robust to alternative specifications.

C. Trade:

I use several variables to measure openness and trade, including the import and export share of GDP, and the growth rates of exports and imports. As reported in the previous section, studies that have looked at the effect of trade on growth have been inconclusive. Andrés et. al. (1996) find in a pooled sample of the OECD countries that only the growth of exports was robust to several different specifications. Kormendi & Meguire (1985) and Levine & Renelt (1992) both show a positive, but non-robust, correlation between the growth of exports and average real GDP growth. De Gregorio (1992) finds no significant relationship between economic growth and trade variables for 12 Latin American countries.

D. Political instability:

I use several different measures of political instability, all of which move over time.[13] PCOUPS is measured at the beginning of each 5 year period, and is the number of coups a country has experienced since independence divided by the total years of independent rule. NEWCOUPS is the number of coups that occurred during each five year period, and LAGCOUPS is the number of coups that have taken place in the last ten years. PMIL, measured at the start of each 5 year period, is the number of years a country has been under military rule since independence, as a percentage of total years of independence.

INTER is the ratio of the number of military interventions since independence to the number of years of independent rule. NEWINTER is the number of military interventions in each 5 year period, and LAGINTER is the number of interventions in the last ten years. AVGTERM is the average length of the presidential term since independence and is measured at the beginning of each 5 year period. I expect coups, military interventions, and military rule to be negatively related to real GDP growth. The relationship between presidential term length and economic growth is an empirical question and is difficult to predict in advance.[14]

[13] All of the instability variables are created with data from Bienen & van de Walle (1991).

[14] It is possible that extreme values of government turnover are correlated with low economic growth, where both high turnover and no turnover in regime has a harmful effect on investment and growth.

III. Results

A. The augmented Solow model

Before testing whether macro and political variables can help to explain real GDP growth in Latin America, I first estimate a regression with the augmented Solow variables, including initial per-capita GDP at the beginning of each 5 year period, the level of investment and human capital, and the growth rate of population. Equation 1 in Table 1a reports the results of the regression. The coefficient on initial wealth is negative and significant, which indicates the existence of conditional convergence in the region. Investment and population growth are both strongly positively and significantly related to real economic growth, which is consistent with previous empirical work. Human capital, measured by the average number of years of secondary education in the total population, is negatively and significantly related to real GDP growth. As discussed in endnote 10, I estimated the same model using average years of schooling (a variable from Kyriacou) and found similar results. The negative correlation between education and economic growth is consistent with the findings of De Gregorio (1992), who reports a negative and significant relationship between the two in a sample of 12 Latin American countries.[15]

In the three sub-sections below, I test whether government policy, trade, and political stability have a significant effect on growth in Latin America. In each sub-section, I first add variables one at a time to the base regression to check their individual significance. Second, I include all individually significant regressors in a single regression to further investigate their effect on real GDP growth. In Table 6, I estimate a regression with all of the significant regressors from the sub-sections to try to find the model that best explains economic growth in the region.

B. Government policy

To test whether government policy has significant effects on real GDP

[15] The average number of years of education attained is only a proxy for human capital. Differences in educational quality may mean that such a variable is a poor reflection of real human capital levels in the region. An interesting future research subject would be to investigate in depth the reasons for the negative relationship between educational attainment and economic growth in Latin America.

growth in Latin America, I add various policy variables to the augmented Solow model, including the growth in government consumption expenditures, the growth of the money base, and the variability of money growth. Equation 2 of Table 1a shows that the growth in government consumption expenditures is negatively correlated with real GDP growth at the .01 level, which is consistent with the findings of Grier (1989, 1997). Equation 3 investigates whether the effect of government consumption spending has a non-linear effect on real GDP growth. I find that the growth in government spending and that growth squared are both negative and significant at the .005 levels, which means that extreme values of this variable are harmful to growth. Rates of decline in the size of government consumption of up to 15% are correlated with increases in real GDP growth. Positive government growth, or rates of decline of greater than 15%, both have a negative effect on economic growth. Figure 1 illustrates the relationship between the growth of government consumption and real GDP growth, showing the sample average values of government consumption growth for various countries in the sample.

In Table 1b, I test whether money growth and the variability of money are significantly related to real GDP growth. Equation 4 reports the results of adding money growth was included in the regression. Money growth is negative and significant at the .01 level; an increase in money growth by one standard deviation results in a fall in real economic growth by .55 percentage points. Equation 5 shows that the variability of money growth is also negatively and significantly related to real GDP growth. An increase in variability by one standard deviation is associated with a decrease in economic growth of .41 percentage points. Figure 2 illustrates the relationship between the variability of money growth and real GDP growth and shows median values of the dependent variable for some of the countries in the region.

Equation 6 presents a regression with all of the policy variables that were independently significant. When the policy variables are included jointly in one regression, money growth is no longer significantly related to real GDP growth and is not included in the best-fit policy model. In the best-fit model in Table 1b, the variability of money is still negatively related to real GDP growth, but only at the .10 level. The growth of government consumption expenditures, and this growth squared, remain negatively correlated with real GDP growth at the .01 level.

B. Trade

Table 2 reports the effect of trade on economic growth in Latin America. In this section, I test whether trade shares and the growth of trade are significantly correlated with real GDP growth. Trade shares (imports and exports as a % of GDP) were found to be insignificantly related to economic growth in every estimation, which is consistent with the empirical literature on trade and growth.[16]

[16] Until the 1980s, the trade policy of most Latin American countries was import substitution. With the crisis in 1982 and the subsequent reforms, the region opened their economies to international

De Gregorio (1992), Levine & Renelt (1992), and Harrison (1996) all find trade shares to be insignificantly correlated with real GDP growth. Quah & Rauch (1990) report a weak correlation between trade shares and growth, but argue that this relationship is due mostly to Ashort-run cyclical fluctuations.@[17]

Equation 7 shows the results of including import growth in the regression. The variable is positively and significantly correlated with real GDP growth at the .05 level, meaning that countries with higher import growth also, on average, have higher economic growth. The results show that an increase in the growth rate of imports by one standard deviation is associated with a .20 percentage point increase in real GDP growth. Equation 8 includes export growth in the regression, which is only related to growth at the .10 level. Equation 9 shows that when the two variables are estimated jointly in a single regression, the significance of both falls dramatically. The best-fit model using trade data includes only import growth and thus is the same specification as equation 7.

The finding that export growth is only weakly correlated with economic growth is different from the positive correlation most often reported in the empirical literature. Feder (1983), Helliwell & Chung (1991), Bleaney (1996), and Andrés et.al. (1996) all report a positive and significant correlation between export growth and real GDP growth. Kormendi & Meguire (1985) and Levine & Renelt (1992),

trade and began to vigorously promote exports. I try to control for this regime change in two ways. First, I estimate the equations from Table 2 in 3 separate decade regressions and find that the trade share variables are insignificantly related to real GDP growth in every decade.

Second, using Sachs & Warner's (1995) criteria of openness, I create a variable that measures the percentag of time in the last 5 years that a country has had an open trade regime. The Sachs & Warner data includes all of the countries in my sample except Panama. In a regression (of 16 countries) with the augmented Solow variables and the openness variable, I find a positive relationship between open trade regimes and real GDP growth on average. When the other significant independent variables are included in the regression, the openness variable becomes insignificant.

[17] One potential problem of using import share to measure trade policy is that the variable only measures total imports (as a % of GDP), without looking at the composition of the imports. Especially in developing countries, the composition of the imports may be as important as the total percent in determining future economic growth.

on the other hand, find in cross-sectional studies of diverse countries that the relationship between the two is not robust to alternative specifications. Similarly, my results show no strong correlation between trade variables and economic growth in a panel of Latin American countries over thirty years.

D. Political stability

As described in Section III, I use several variables to proxy political instability, including coups (both past and present), military interventions (past and present), the percentage of years since independence under military rule, and the average presidential term length. When adding the variables individually to the model, I find that the percent of time since independence under military rule, recent coups, and ratio of military interventions to independent rule all significantly related to real GDP growth. The rest of the instability variables are insignificantly related to growth in every estimation and are not reported in Table 3.[18]

Equation 10 of Table 3 shows a negative and significant relationship between the percent military rule and real GDP growth. An increase in the percentage of time since independence spent under military rule by one standard deviation reduces GDP by .26 percentage points on average. Equation 11 reports the effect of including recent coups in the regression. Unlike Londregan & Poole (1990), who find no statistically significant relationship between recent coups and real GDP growth, my results show a negative and significant relationship between the two. An increase in the number of recent coups by one standard deviation is associated with a drop on average in real GDP growth by .21 percentage points.

The effect of military interventions (as a % of independent rule) on average growth is even stronger. Equation 12 shows that the total number of military interventions since independence is correlated with growth at the .025 level. Real GDP growth drops by .32 percentage points on average when the total number of military interventions increases by one standard deviation.

Equation 13 shows that when all three variables are estimated in a joint regression, military rule and interventions are no longer significantly related to growth. The best-fit equation of the instability variables includes both recent coups and interventions (which is significant at the .05 level when the military rule variable is dropped from the regression).

E. The Best-Fit model for the period 1960-1990

In Equation 14, I estimate one regression with all of the significant regressors from the three sub-sections above and find that the political instability

[18] Average executive turnover is insignificant both when added individually to the regression and when included with its square (to test for a non-linear effect of turnover on growth).

variables are no longer statistically significant.[19] The coefficient on import growth also drops to the .10 level and becomes completely insignificant when the two instability variables are excluded from the regression. The Best Overall Fit model reports the empirical model that best explains growth in the region. There is still evidence of conditional convergence, as the coefficient for initial wealth is negatively and significantly correlated with real GDP growth. The growth of government consumption (and growth squared) is negatively and significantly related to growth at the .05 level. The variability of money is only weakly related to real GDP growth in this regression, with a significance level of .10.[20]

[19] This result is consistent with Fedderke & Klitgaard (1998), who show that political instability variables are significant when tested in isolation, but insignificant in models with a larger set of regressors, and with de Haan & Siermann (1996), who claim that political instability is not significantly related to economic growth in Latin America.

[20] In Table 4, I also estimate a similar model for the years 1950-1990, although the human capital variable is excluded due to data availability problems. Both the Barro & Lee and the Kyriacou education data go back the 1960s, the reason for which this study considers the 1960-1990 time period. The growth of government consumption and its square continue to be negative and significant at the .005 level. The variability of money growth is negative and significant in this expanded sample. An increase in variability by one standard deviation results in a .39 percentage point fall in real GDP growth.

I perform a likelihood ratio test to test the null hypothesis that the three macro variables are not significant as a group in the 1960-1990 sample. The calculated Chi-square statistic is 17.8, which means that I can reject the null at the .005 level that the added variables do not significantly help to explain growth.[21]

While the macro variables are statistically significant, their quantitative impact on growth is small. Table 5 uses the augmented Solow model and the expanded best-fit regression to predict growth rates in the region from 1960-1990. The table lists dyhat, which is the predicted growth rate, and dyerr, which is the growth rate minus dyhat. The results show that the average absolute error is .46 percentage points for the augmented Solow model and .44 percentage points for the expanded model. The inclusion of the macro variables does not considerably decrease the prediction error of the augmented Solow model.

F. Results from the decade regressions

In this section, I use OLS to test whether the addition of the variables in the best overall fit model significantly increase the predictability of the model in 3 separate decade regressions. Table 6 shows the result of these regressions.

Given that the augmented Solow model was able to forecast Latin American growth rates almost as well as the expanded model, it is not surprising that the inclusion of macro variables in each decade regression does very little to help explain growth. The inclusion of the variables from the best-fit regression in the sixties increases the R^2 from .49 to .54. I construct an f-test of the null hypothesis that the three macro variables are not significant as a group. The calculated value is .833, which means the null hypothesis can not be rejected at any reasonable significance level.[22]

In the 1970s, the inclusion of the three macro variables increases the R^2 from .44 to .57. The calculated f-statistic testing the null hypothesis that they are not significant is 2.37, meaning the null hypothesis can not be rejected at the .01 or .05 level. Similarly, testing the null hypothesis that the augmented Solow variables are sufficient to explain growth in the 1980s yields an f-statistic of 1.876, which is insignificant at any reasonable level.

In contrast, Andrés et.al. (1996) find that macroeconomic variables can significantly increase the predictive power of the augmented Solow model in the OECD. When they add their robust macro variables (inflation and money variability and export growth) to the basic model, the R^2 increases 92% in the 1965-70 regression, 78% in the 1975-80 period, 339% in 1980-85, and 108% in 1985-90.

[21] The critical value at the .005 level with 3 degrees of freedom is 12.838.

[22] The critical value at the .01 (.05) level for 3 and 25 degrees of freedom in the numerator and denominator, respectively, is 4.68 (2.99).

The findings in this paper, taken together with those of Andrés et.al., indicate that the factors which are important for growth are not the same across regions.

IV. Conclusion

In this paper, I look at the effect of macro and political variables on real GDP growth in a sample of 17 Latin American countries for 1960-1990. I find that the addition of the macro and political variables only marginally increases the explanatory power of the model. In the full sample, the growth of government consumption and the variability of money are significantly and negatively related to growth, but their quantitative impact on growth is small. When the sample is divided into decades, I find that the empirical significance of the variables disappears completely and that in each decade regression, I can not reject the null hypothesis that the macro variables are insignificant as a group.

Levine & Renelt (1992), in a large cross section of countries, found that macro and political variables are not robustly correlated with real economic growth. Many economists have used the Levine & Renelt findings to argue that macro-political variables do not matter for growth. The results of this paper, along with those of Andrés et.al., indicate that the factors important for growth are not the same for every region. What matters for growth in the OECD is different from what matters in Latin America. Instead of searching for a single empirical model for the entire world, which an enterprise doomed to failure, we should study what policies matter for which regions and why the differences exist.

Appendix 1:

Countries used in the sample

Costa Rica	Argentina	Peru
Dominican Republic	Bolivia	Uruguay
El Salvador	Brazil	Venezuela
Guatemala	Chile	
Honduras	Colombia	
Mexico	Ecuador	
Panama	Paraguay	

Appendix 2:

Sources of the variables used in the paper

Summers & Heston (1991): real GDP growth, initial income, investment, population growth, and the growth of government consumption expenditures.

IMF international financial statistics: the growth of the money base, the variability of money growth, and import, export, and trade balance variables.

Bienen & Van de Walle (1991): all political stability variables

Barro & Lee (1994): average years of secondary education of the population

Appendix 3

Summary statistics of the variables

	Mean	Std. Deviation
Economic variables		
Avg. Real GDP growth	3.80	2.98
Initial wealth	2979	1622
Investment	16.01	4.86
Avg. Yrs Sec. Education	0.73	0.42
Population growth	2.44	0.73
Policy variables		
Growth in govt consump	0.19	3.94
Money growth	86.5	275
Std. Dev. of money	96.2	409
Trade variables		
Import growth	0.54	8.5
Export growth	1.02	6.4
Imports (% of GDP)	22	10.1
Exports (% of GDP)	21.2	9.7
Instability variables		
Mil. Rule (%)	41.1	18.3
Total coups	16.1	6.92
Recent coups	0.53	0.97
Lagged coups	1.11	1.48
Military Interventions (%)	0.14	0.07
Recent mil. interventions	0.58	0.85
Lagged mil. interventions	4.4	3.95
Pres. Term length	3.2	0.66

Table 1a

The effect of government policy on economic growth in Latin America, 1960-1990

Variables	Eq. 1	Eq. 2	Eq. 3
Constant	2.01 (2.9)	1.80 (2.7)	2.35 (4.2)
Initial Wealth	-.0004 (3.4)	-.0004 (3.4)	-.0004 (4.3)
Investment	.17 (5.6)	.15 (5.3)	.16 (6.1)
Human Capital	-.89 (2.0)	-.49 (1.1)	-.64 (1.5)
Pop. Growth	.71 (3.7)	.81 (4.3)	.68 (4.1)
%Govt. Cons.	*	-.06 (2.5)	-.14 (4.3)
% Govt. Cons. Sq.	*	*	-.009 (5.2)
N	102	102	102
LLF	-167.5	-167.2	-157.8

The numbers in parentheses are t-statistics. Time dummies were included in the regressions but are excluded here for reasons of space.

Table 1b

The effect of government policy on economic growth in Latin America, 1960-1990

Variables	Eq. 4	Eq. 5	Eq. 6	Best Fit of Govt. Pol.
Constant	2.36	2.33	2.26	2.26
	(3.9)	(3.8)	(4.0)	(4.0)
Initial Wealth	-.0004	-.0005	-.0004	-.0004
	(4.6)	(4.5)	(4.3)	(4.3)
Investment	.17	.18	.15	.15
	(5.6)	(5.7)	(5.8)	(5.6)
Pop. Growth	.64	.66	.72	.71
	(3.6)	(3.7)	(4.4)	(4.4)
Human Capital	-.83	-.84	-.51	-.51
	(1.9)	(1.9)	(1.2)	(1.2)
Money growth	-.002	*	.0002	*
	(4.5)		(.07)	
Std. Dev. money	*	-.001	-.001	-.001
		(4.2)	(.43)	(1.6)
% Govt. cons.	*	*	-.16	-.16
			(4.5)	(4.5)
%Govt.cons. sq	*	*	-.008	-.008
			(3.4)	(3.7)
N	102	102	102	102
LLF	-161.3	-162	-158.6	-158.6

The numbers in parentheses are t-statistics. Time dummies were included in the regressions but are excluded here for reasons of space.

Table 2

The effect of trade on economic growth in Latin America 1960-1990

Variable	Eq. 7	Eq. 8	Eq. 9	Best Fit of Trade variables
Constant	2.12 (3.0)	2.20 (3.1)	2.24 (3.0)	2.12 (3.0)
Initial Wealth	-.0004 (3.7)	-.0004 (3.8)	-.0005 (4.3)	-.0004 (3.7)
Investment	.18 (5.8)	.18 (5.9)	.18 (5.8)	.18 (5.8)
Pop. growth	.68 (3.5)	.67 (3.4)	.67 (3.3)	.68 (3.5)
Human capital	-.92 (2.0)	-.99 (2.3)	-.94 (2.1)	-.92 (2.0)
Import growth	.023 (1.8)	*	.024 (1.4)	.023 (1.8)
Export growth	*	.02 (1.5)	.003 (.18)	*
N	102	102	102	102
LLF	-166.7	-166.4	-167.5	-166.7

The numbers in parentheses are t-statistics. Time dummies were estimated but are excluded for reasons of space.

Table 3

The effect of political instability on economic growth in Latin America, 1960-1990

Variables	Eq. 10	Eq. 11	Eq.12	Eq. 13	Best Fit of Instab. Vars.
Constant	2.69 (3.4)	2.09 (3.0)	2.70 (3.6)	2.60 (3.4)	2.77 (3.6)
Initial Wealth	-.0004 (3.4)	-.0004 (3.9)	-.0004 (3.6)	-.0005 (3.9)	-.0005 (4.1)
Investment	.17 (5.5)	.17 (5.5)	.16 (5.3)	.16 (5.1)	.16 (5.2)
Pop. Growth	.69 (3.6)	.77 (4.0)	.72 (3.8)	.80 (4.1)	.76 (4.0)
Human Capital	-.96 (2.2)	-.65 (1.5)	-.92 (2.1)	-.66 (1.5)	-.67 (1.6)
Mil. Rule (%)	-.014 (1.94)	*	*	.022 (.01)	*
Recent coups	*	-.22 (2.4)	*	-.20 (2.0)	-.19 (1.94)
Mil. Inter.(%)	*	*	-4.5 (2.1)	-3.8 (.73)	-3.95 (1.84)
N	102	102	102	102	102
LLF	-166.6	-164.6	-165.9	-164.8	-163.96

The numbers in parentheses are t-statistics. Time dummies were included in the regressions but are excluded here for reasons of space.

Table 4

Pooled growth regression for Latin America, 1960-1990, including all significant macro variables

Variables	Eq. 14	Best Overall Fit, 1960-1990	Best Overall Fit, 1950-1990
Constant	2.59 (4.0)	2.26 (4.0)	1.26 (2.0)
Initial Wealth	-.0004 (4.4)	-.0004 (4.3)	-.0004 (5.0)
Investment	.15 (5.7)	.15 (5.6)	.15 (6.8)
Pop. Growth	.71 (4.4)	.71 (4.4)	.91 (5.5)
Human Capital	-.54 (1.3)	-.51 (1.2)	*
%Govt. Cons.	-.14 (3.9)	-.16 (4.5)	-.08 (4.0)
% Govt. Cons. Sq.	-.008 (3.3)	-.008 (3.7)	-.005 (4.9)
Std. Dev. money	-.001 (1.7)	-.001 (1.6)	-.001 (2.3)
Recent coups	-.10 (1.0)	*	*
Mil. Inter. (%)	-.78 (.42)	*	*
Import growth	.02 (1.6)	*	*
N	102	102	136
LLF	-157.96	-158.6	-231.3

The numbers in parentheses are t-statistics. Time dummies were estimated but are not reported for reasons of space.

Table 5:

Real and predicted average per capita growth rates:

Country	Expected growth	error
With the variables from the Augmented Solow Model		
Costa Rica	4.23	0.38
Dominican Rep.	4.55	0.04
El Salvador	3.06	0.08
Guatemala	3.61	0.09
Honduras	5.00	-0.81
Mexico	3.52	1.41
Panama	4.31	0.21
Argentina	2.10	-0.42
Bolivia	3.83	-0.15
Brazil	4.35	0.77
Chile	3.22	-0.07
Colombia	3.79	0.85
Ecuador	5.33	-0.43
Paraguay	4.20	0.62
Peru	4.13	-1.29
Uruguay	1.02	0.14
Venezuela	3.13	-0.04
Avg. Absolute error	.459	
With the expanded regression with macro variables:		
Costa Rica	4.41	0.20
Dominican Rep.	4.44	0.06
El Salvador	3.10	0.04
Guatemala	3.73	-0.03
Honduras	5.10	-0.91
Mexico	3.37	1.56
Panama	4.52	-0.01
Argentina	2.10	-0.42
Bolivia	3.69	-0.001
Brazil	4.32	0.80
Chile	3.62	-0.46
Colombia	3.94	0.70
Ecuador	5.41	-0.51
Paraguay	4.52	0.29
Peru	3.93	-1.1
Uruguay	1.1	0.08
Venezuela	2.84	0.25
Avg. Absolute error	.436	

Table 6

Decade estimations of Latin American growth, using OLS

Variable	1960-1969 (a)	1960-1969 (b)	1970-1979 (a)	1970-1979 (b)	1980-1989 (a)	1980-1989 (b)
Constant	-.36	.41	5.4	4.1	-1.9	-.60
	(1.5)	(.15)	(2.2)	(1.7)	(.99)	(.30)
Initial Wealth	-.0002	-.0002	-.001	-.0005	-.0003	-.0003
	(1.3)	(1.1)	(3.0)	(1.9)	(1.4)	(1.2)
Investment	.12	.01	.28	.29	.17	.14
	(1.9)	(1.3)	(2.8)	(3.1)	(2.2)	(1.8)
Pop. Growth	1.5	1.3	-.29	-.15	.40	.17
	(3.3)	(1.9)	(.37)	(.19)	(.77)	(.33)
Human Capital	.14	.52	-3.8	-3.0	-.57	-.64
	(.15)	(.54)	(2.3)	(1.7)	(.59)	(.64)
%Govt. Cons.	*	-.11	*	-.33	*	-.12
		(1.4)		(2.5)		(1.2)
% Govt. Cons Sq.	*	-.0001	*	.01	*	-.008
		(.01)		(.34)		(1.1)
Std. Dev. money	*	-.019	*	-.02	*	-.001
		(.39)		(.84)		(1.6)
R^2	.491	.537	.442	.566	.452	.553
N	34	34	34	34	34	34

The numbers in parentheses are t-statistics. Time dummies were estimated but are not reported for reasons of space.

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