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AN EMPIRICAL ANALYSIS OF ECONOMIC GROWTH FOR URUGUAY AND THE LATIN AMERICAN REGION: 1950-2000*

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ABSTRACT

The modern growth literature studies the relationship between countries' economic growth and a variety of social, economic and political indicators. In its most recent empirical analyses a positive association is found between variables that reflect political stability, high literacy rates, homogeneous middle class societies, low poverty and inequality levels and countries overall growth rates. This paper investigates the extent to which the Uruguayan and Latin American economic growth experiences of the last fifty years can be assessed within the framework of both traditional and modern theories of economic growth. Its findings are that differences in population growth and capital accumulation account for an important observed variation in the gross domestic product across countries. In addition to the cross-section growth analysis, from which almost all-previous studies derive their results, a beginning is made towards obtaining estimates based on panel data for the Latin American case. The inclusion of the individual country effect that corrects for the cross-section omitted variable bias problem, augments the estimated convergence rates and has a significant impact on the growth regression results. Moreover, and once the determinants of income on the balance path are effectively controlled, conditional convergence is found for the four samples analysed. Furthermore, it is shown that while cross-country regressions can highlight some useful factors that are statistically correlated with economic growth, a richer understanding of the dynamics of growth at the country level is needed and requires a thorough investigation of the institutional structures. The individual country study case casts doubt on many deep-seated ideas within the growth and development community: the Uruguayan economic process cannot be fully captured within the framework of the theories of growth. In this sense, it is showed that in contradiction with these theories' main predictions, this small Latin American country, which maintained during the past century the comparatively better overall social indicators of the region, was the one who registered the poorest growth rate. The paper stresses the need of further research referring this particular and paradoxical experience where the precise nature of the traditional hypothesised relationships should be reconsidered.

CONTENTS

1 INTRODUCTION

Since the pioneer work of Adam Smith in 1776, economic growth has been a central objective of study for the economic science. Through the last two centuries, with the consolidation of the national states, the quest of sustainable growth paths became a central objective of economic policy for the different governments throughout the world.

In 1956, Robert Solow published *A Contribution to the Theory of Economic Growth*, a paper that established itself as the milestone from which the main neo-classical growth studies such as Cass (1965) and Koopmans (1965) further developed. The Solow model, by assuming a closed economy producing one single good through a standard neo-classical production function (with capital and labour as inputs) concluded that two variables alone, saving and population growth, should explain an important fraction of the observed countries' incomes.

According to the orthodox neo-classical model, with no exogenous technological progress, economies in the long run reach a steady state with zero growth in income per head. Therefore, measures to promote growth can only enhance short and medium growth rates and long run levels of consumption and output.

The model predicts that economies converge to their balanced growth path, and that, since by the assumption of diminishing returns the rate of return to capital is lower in countries with more capital per worker, poorer countries will grow faster catching up with richer ones.

However, throughout the XX century some emerging stylised facts regarding the evolution of economies over time seemed to defy the main neo-classical predictions. Among these were the observed huge variation in per capita income, substantial differences in growth rates over time, the Latin America stunted growth performance, the fact that countries switched relative positions (Uruguay versus Asian Tigers) and the Africa's growth collapse.[1]

Since traditional models did not provide satisfying answers to the central issues above outlined, a theoretical revolution in the economics of growth field that begins with the work of Romer (1986) and Lucas (1988) took place during the 1980s and the 1990s.

[1] Easterly, W. and R. Levine (1997) 'Africa's Growth Tragedy: Policies and Ethnic Divisions', Quarterly Journal of Economics 112(4): 1203-1250.

In an attempt to overcome the inadequacies of the orthodox neo-classical model, by introducing increasing returns to scale, imperfect competition and by endogenising the "Solow residual",[2] the new growth theory changed the traditional emphasis put on savings, population growth and technological progress as the main determinants of economic growth. Additionally, according to this new framework social policies and political stability should play an important role in the process of achieving higher and sustainable growth rates.

It is the purpose of the present paper to determine, from a comparative perspective, the extent to which both exogenous and endogenous theories are able to account for the last fifty years experiences of economic growth in Uruguay and the Latin American region.

According to Filgueira, Furtado and Kaztman (2000):

> From the early decades of the twentieth century onward, the level of equity achieved in Uruguay, and the sophistication of its social welfare institutions, set the country apart from the rest of Latin America. In the second half of the century, this heritage of democracy and equity survived the severe tests to which it was subjected without fracturing too badly. The strength of the country's socio-cultural foundations was convincingly demonstrated after the restoration of democracy in 1985, when Uruguay succeeded in maintaining the position it had traditionally held as the regional leader in social development…. The absence of significant ethnic and cultural divisions, substantial primary product surpluses and early democratic consolidation were some of the factors that helped establish the socio-cultural foundations which were to give rise to this special position.[3]

However, during the second half of the twentieth century, and in spite of these positive socio-political factors, the country performed poorly in terms of economic growth. Before the 1982 financial crisis, when GDP fell 7.5%, the Uruguayan economy already presented the lowest average expansion of the region: from 1945 to 1983, its rate was of just 2% against a Latin American average of 5.4%.[4]

Nowadays, after both Brazilian 1999 and Argentinean 2001 devaluations, the country is facing one of the major crises in its history, taking into account both its duration and intensity. The main characteristics of the actual crisis are falling production

[2] Although technology is a central component of neoclassical theory, the source of technological progress is left unexplained by the Solow model. Therefore, one of the main objectives of the endogenous theory is to take into account the role of technological progress for growth. In doing so, the new approach creates different economic models to explain technological improvement.

[3] Filgueira, F., M. Furtado and R. Kaztman (2000) 'New Challenges for Equity in Uruguay', CEPAL Review 72, pp. 79-80.

[4] CINVE (1984) La Crisis Uruguaya y el Problema Nacional [The Uruguayan Crisis and the National Issue]. Montevideo: Ediciones de la Banda Oriental, p. 58.

levels, 20% of unemployment in the urban labour force, dramatic levels of underemployment, trading disequilibrium and increasing debt and fiscal deficit.

Regarding this long-run economic process, the paper intends to determine whether in contradiction with the postulates of the theory of growth, the country with the comparatively better overall economic, social and political conditions registered in the second half of the twentieth century the lowest growth rate of the region.

Its points of departure are the empirical works of Mankiw, Romer and Weil (1992) and Islam (1995). The recent availability of the updated version of the Summers and Heston cross-country data set allows the analysis to cover an extended period of 49 years (1950-1998), marking a useful variation from traditional short-run empirical growth studies based in power purchasing parity income series.

In doing so, it first turns to test the two main predictions of the neo-classical model. These include the analysis of the traditional factors that should account for the observed variation in income across countries and the convergence issue.

After this, the paper focuses on the insights that both the old and new theory of growth can give to the analysis of what is defined as an economic history paradoxical process: the Uruguayan growth evolution registered between 1950 and 2000.

The paper's findings are that differences in savings and population growth account for an important observed variation in income across countries. Moreover, and once the determinants of the GDP on the balance path are effectively controlled, convergence is found for the four samples of countries analysed: economies converge to their own steady states which are ultimately determined by saving, population growth and education.

In spite of achieving good overall results in describing the cross-country data, when confronted with the historical growth process of "the leader in social development" of the region, important problems arise. The Uruguayan economic evolution of the second decade of the twentieth century presents in this respect an interesting and intellectually appealing study case.

Neither the exogenous nor the endogenous approaches are able to account for this experience. The paper calls for a profound re-examination of the main hypothesis formulated in the framework of the theory of economic growth.

It is organised as follows. Section 2 is firstly devoted to reviewing the development of the theoretical framework of the neo-classical and endogenous theories of growth. After this, an estimation of both the standard and augmented Solow model is

performed for four different samples of countries: non-oil, intermediate, OECD and Latin America. Moreover, and in order to determine whether the model is useful to capture the Uruguayan economic growth experience, a dummy variable for this country is also included in the estimation.

In Section 3, in order to test the second main prediction of the neo-classical growth literature and with the purpose of focusing on the study of the Latin American economic growth process, an empirical cross-country convergence analysis is performed.

Section 4 introduces a panel data convergence analysis for the Latin American region, in an attempt to overcome two of the main problems that arise from using the cross-section methodology: omitted variable and endogeneity bias.

Using both the exogenous and endogenous growth analytical frameworks, Section 5 confronts the Uruguayan and Latin America's economic processes of the last fifty years with the evolution of their main economic, social and political indicators. Conclusions are provided in Section 6 alongside key policy implications.

2 ECONOMIC GROWTH IN THE NEO-CLASSICAL FRAMEWORK

2.1 The exogenous growth theory

Neo-classical growth theory has different predecessors. These include the "classical" theories of Smith, Ricardo, Malthus, Marx and the "Keynesian" growth models of Harrod (1939) and Domar (1946).

Its points of departure are the equilibrium growth models of Solow (1956) and Swan (1956). These authors demonstrated that if there were no technological progress, the effects of diminishing returns to scale would cause the growth of output per worker to cease. The capital-labour ratio converges to some long-run equilibrium value, as the real wage, the rate of return to capital and the level of income per capita do.

These equilibrium values depend on the saving rate but the long run rate of growth of output is exogenous, being equal to the rate of population growth. Consumption per capita converges to a stationary equilibrium value and policies to enhance growth can only influence the short term.

According to the theory, countries under the level of the steady state grow faster than countries closer to it. In the same vein, capital scarce countries grow faster than capital-abundant countries.

The problem is that the driving force of long-run growth, the rate of increase in the effectiveness of labour (the technological progress) is exogenous. Therefore, the model provides an incomplete description of the growth process.

The theory proved to be a useful descriptive tool but many unexplained answers remained: the "Solow residual" or "measure of our ignorance". The growth analysis had therefore a need to find ultimate causes and explain technological progress.

2.2 New insights: endogenous growth theory

Dissatisfaction with the exogenous approach to study growth and modelling of externalities and monopolistic competition resulted in endogenous growth theories. These, by making an attempt to explain how technological progress occurs, included the central hypothesis of non-diminishing returns to capital in their formulations.

Different authors developed various models in which long-run growth rates could be determined by the same factors that had been previously regarded as affecting only short or medium term growth. The engine of growth became then a part of the model itself: it results from the maximising actions of individual economic agents.

Among others, the main challenges for the new growth theory were:

- How to modify the neo-classical theoretical framework to include endogenous long-run growth in income per capita?
- How is the growth rate affected by variables such as public goods, finance, trade, taxes, demographic factors, income distribution and social norms?

For Aghion and Howitt (1998), the purpose of modern growth theory is to seek some understanding of the interplay between technological knowledge, the structural characteristics of the economy and the society, and how such interplay results in economic growth.

Generally, the factors identified as giving rise to endogenous growth are human capital accumulation, research and development, international trade, infrastructure and the role of the government and the institutions.

In order to study the way in which these different factors affect economic growth, several explanatory variables have been considered in the most recent empirical studies: corruption, democracy, education, financial sophistication, inequality, inflation, latitude, civil liberties, price levels of investment, religion, rule of law and trade policies among others.

This section studies the extent to which the theory of growth is useful to understand the reasons behind the observed world-wide cross-country differences in income per capita. Its main focus is the analysis of the usefulness of the Solow model to explain the Latin American growth experience between 1950 and 1998.

The initial approach to the empirical analysis is given by the study performed by Mankiw, Romer and Weil (1992) where both the traditional and the augmented Solow model (that includes human capital) are tested.

These authors concluded that for the 1960-1985 period, the augmented Solow model, where differences in saving, education and population growth should explain cross-country differences in income per capita, happens to be consistent with the international economic growth experience.

2.3 The Solow model specification

In this section, the empirical analysis attempts to identify the relevance of the neo-classical growth model to understand the factors underlying the variations in per capita income for different samples of countries, specially focusing on the results for Uruguay and the Latin American countries.

Following Mankiw, Romer and Weil (1992), production at time t is given by a Cobb-Douglas function where output (Y) is related with capital (K), labour (L) and the level of technology (A) through the following specification:

$$(1) \qquad Y(t) = K(t)^{\alpha}(A(t)L(t))^{1-\alpha} \quad 0 < \alpha < 1$$

L and A grow exogenously at rates n and g respectively. Defining k as the per capita stock of capital and y as the level of output per capita, the evolution of k is given by the following equation:

$$(2) \qquad \dot{k}(t) = sk(t)^{\alpha} - (n + g + \delta)k(t)$$

The "advancement of knowledge" rate (g) and the rate of depreciation (δ) are assumed to be constant among countries and $g + \delta$ is assumed to be 0.05.[5]

Equation (2) implies that k converges to a steady state where:

[5] Mankiw, N.G., D. Romer and D.N. Weil (1992) 'A Contribution to the Empirics of Economic Growth', Quarterly Journal of Economics 107(2): 407-438.

(3) $$k^* = [s/(n+g+\delta)]^{1/(1-\alpha)}$$

Substituting (3) into the production function and taking logs yields the steady state of income per capita:

(4) $$\ln\left[\frac{Y(t)}{L(t)}\right] = \ln A(0) + gt + \frac{\alpha}{1-\alpha}\ln(s) - \frac{\alpha}{1-\alpha}\ln(n+g+\delta)$$

The model assumes that the rates of saving, population growth and technological progress are exogenous and that the $A(0)$ term, which reflects technology, resource endowments, and institutions can be expressed as:

(5) $$\ln A(0) = a + \in$$

where a is a constant and $\in$ is the country specific shock. Therefore, log income per capita at a given time t is:

(6) $$\log\left(\frac{Y}{L}\right) = a + \frac{\alpha}{1-\alpha}\log(s) - \frac{\alpha}{1-\alpha}\log(n+g+\delta) + \varepsilon$$

Equation (6) allows us to test the central prediction of the Solow model regarding the effects of savings (s) and population growth (n) on real income.

Moreover, in order to assess the extent to which neo-classical growth meets the modern endogenous approach, the human capital dimension could be introduced to the above specification yielding:

(7) $$\log\left(\frac{Y(t)}{L(t)}\right) = \log A(0) + gt + \frac{\alpha}{1-\alpha}\log(s_k) - \frac{\alpha}{1-\alpha}\log(n+g+\delta) + \frac{\beta}{1-\alpha}\log(h^*)$$

Equation (7) represents income per capita as a function of the rate of investment in physical capital, the rate of population growth and the level of human capital.

2.4 The data and the samples

The recent availability of the Heston, Summers and Aten (2001) Penn World Table Version 6.0, has been crucial to perform the present analysis. The data ranges from 1950 to 1998 and allows to run real international quantity comparisons between countries and time since it includes measures of macroeconomic variables in a common set of prices.

With the ultimate purpose of comparing this paper's results with the ones obtained by Mankiw, Romer and Weil (1992), the three samples used by them where keep almost unchanged: non-oil, intermediate and OECD (see Appendix 1).

The non-oil and intermediate samples consist respectively of 95 and 74 developed and less developed countries from which data were available for the period 1960-1998. Three countries (Liberia, Somalia and Burma) from the first sample and one (Burma) from the second one were respectively removed since data on GDP and savings were not available for the totality of the period under analysis.

Luxembourg was added to the OECD sample (23 countries), and a sample was created for the Latin American and Caribbean countries for which values of GDP per capita from 1950 to 1998 were available. The latter consists of 20 countries.

Since only complete data from 1950 to 1998 was available for the OECD and Latin American samples, the study uses the 1950-1998 period for them and the 1960-1998 period for the non-oil and intermediate cases.

One important difference with the Mankiw, Romer and Weil (1992) study is that variables are introduced in per capita terms instead of being measured in relation with the working age population.

To be consistent with this departure from the previous analysis, the average rate of growth of the working age population was substituted by the rate of population growth computed from the World Bank Development Indicators 2001.

The human capital variable used to test the augmented Solow model is represented by the educational attainment of the total population aged fifteen and over, computed from the Barro and Lee (2001) dataset.

2.5 The exogenous approach: empirical results

The hypotheses being tested in this section represent the main predictions of the neo-classical growth model:

- Differences in saving and population growth account for a large fraction of the cross-country variation in income per capita.
- Saving is positively related with income.
- Population growth is negatively related with income.
- Capital's share in income is equal to 1/3.

- The elasticity of income per capita with respect to the saving rate is equal in magnitude and different in sign to the elasticity of income per capita with respect to the rate of population growth.

The results of the estimation of equation (6) are shown in Table 1.

TABLE 1

Estimation of the textbook Solow model

Dependent variable: log GDP per capita in 1998				
Sample: Observations:	Non-oil 95	Intermediate 74	OECD 23	Latin America 20
Constant	0.112 (1.528)	1.147 (1.582)	8.261* (2.832)	2.096 (2.500)
Log (I/GDP)	1.017* (0.107)	1.035* (0.146)	0.493 (0.368)	0.320** (0.226)
Log ($n+g+\delta$)	-3.919* (0.530)	-3.569* (0.535)	-0.848 (0.895)	-2.714* (0.916)
$\bar{R}^2$	0.74	0.71	0.10	0.34
s.e.e.	0.616	0.590	0.304	0.382
Restricted regression				
Constant	7.647* (0.089)	7.615* (0.123)	9.166* (0.374)	8.269* (0.182)
Log (I/GDP) – Log ($n+g+\delta$)	1.335* (0.095)	1.426* (0.122)	0.573* (0.267)	0.510* (0.241)
$\bar{R}^2$	0.68	0.65	0.14	0.16
s.e.e.	0.689	0.651	0.297	0.433
Test of restriction				
p-value	0.000	0.000	0.751	0.024
Implied α	0.57	0.59	0.36	0.34

Note 1: standard errors are in parentheses.
Note 2: * significant at the 5% level.
Note 3: ** significant at the 10% level.
Note 4: the investment and population growth rates are averages for the period 1960-1998 for the Non-oil and Intermediate samples and for the period 1950-1998 for the OECD and Latin American samples.
Note 5: ($g+\delta$) is assumed to be 0.05.

For the non-oil, intermediate and Latin American samples the model is useful to explain cross-country differences in income per capita. Moreover, the overall fit of the regressions is substantially improved with respect to both the Mankiw, Romer and Weil (1992) analysis and to the one performed for comparative purposes using the per capita variables for the 1960-1985 period (see Appendix 2).

The coefficients on saving and population growth have the predicted signs and are significant, except for the OECD sample. Even though for the first two samples the α predicted value is higher than the observed capital's share in income, for the OECD

and Latin American samples the value is almost identical to one third (0.36 and 0.34 respectively).

However, regarding the prediction that the coefficients on log(s) and $\log(n+g+\delta)$ should be equal in magnitude and different in sign, the restriction is rejected for the non-oil, intermediate and Latin American countries.

2.6 Towards endogenous growth: estimation of the augmented Solow model

Table 2 displays the results of the estimation of the Solow model after including the variable that captures the human capital dimension.

TABLE 2

Estimation of the augmented Solow model

Dependent variable: log GDP per capita in 1998				
Sample: Observations:	Non-oil 95	Intermediate 74	OECD 23	Latin America 20
Constant	4.060* (1.433)	5.002* (1.552)	8.940* (2.056)	6.530* (3.220)
Log(I/GDP)	0.486* (0.124)	0.472* (0.167)	0.159 (0.277)	0.108 (0.235)
Log($n+g+\delta$)	-2.958* (0.472)	-2.652* (0.492)	-1.086** (0.651)	-1.735* (0.980)
Log(human)	0.750* (0.120)	0.789* (0.154)	0.721* (0.165)	0.741* (0.375)
$\bar{R}^2$	0.82	0.79	0.53	0.44
s.e.e.	0.519	0.506	0.220	0.433
Restricted regression				
Constant	8.696* (0.156)	8.726* (0.201)	9.466* (0.278)	8.951* (0.254)
Log (I/GDP) – Log ($n+g+\delta$)	0.552* (0.128)	0.552* (0.169)	0.205 (0.209)	0.096 (0.231)
Log (human) – Log ($n+g+\delta$)	0.889* (0.118)	0.932* (0.146)	0.723* (0.161)	0.924* (0.281)
$\bar{R}^2$	0.80	0.77	0.55	0.45
s.e.e.	0.545	0.523	0.215	0.349
Test of restriction				
p-value	0.002	0.018	0.799	0.462

Note 1: standard errors are in parentheses.
Note 2: * significant at the 5% level.
Note 3: ** significant at the 10% level.
Note 4: the investment and population growth rates are averages for the period 1960-1998 for the Non-oil and Intermediate samples and for the period 1950-1998 for the OECD and Latin American samples.
Note 5: ($g+\delta$) is assumed to be 0.05.
Note 6: human is the average schooling years for the population over age 15 for the period 1960-1998.

The inclusion of the human capital variable improves the overall fit of the regression for the four samples studied. The log of the educational attainment of the population aged 15 and over is significant and has the predicted sign for the four samples studied. Moreover, the values of the coefficients are similar for the different samples.

For the non-oil and intermediate cases the results are striking: 82% and 79% of the cross-country variation in income per capita can be explained by these three variables alone. However, for the OECD and Latin American samples, the saving coefficient is now not statistically significant.

Therefore, while the augmented Solow model is an excellent description of the cross-country variation in income per capita for the larger samples, results are not so attractive for Latin America and OECD countries.

3 ENDOGENOUS GROWTH AND β -CONVERGENCE ANALYSIS

3.1 The theoretical framework

As Romer (1986) points out, the implication of the Solow model for convergence are given by the fact that since:

> the rate of return on investment and the rate of growth of per capita output are expected to be decreasing functions of the level of the per capita stock… wage rates and capital labour ratios across different countries are expected to converge… an exogenous reduction in the stock of capital in a given country will cause prices for capital assets to increase and will therefore induce an offsetting increase in investment. In the absence of technological change, per capita output should converge to a steady-state value with no per capita growth. All these assumptions follow directly from the assumption of diminishing returns to per capita capital in the production of per capita output.[6]

From that proposition, and given that poorer countries will initially exhibit lower capital-labour ratios (implying a higher marginal product), for equal rates of domestic saving, labour force growth and technical progress, their capital stock growth will exceed that in richer countries.

This implies that in the long run a convergence phenomenon in capital-labour, capital-output ratio and income levels occurs. Moreover, the further an economy is below its steady state, the faster it should grow and the closer an economy is with respect to its steady state, the slower it should grow.

[6] Romer, P. (1986) 'Increasing Returns and Long-Run Growth', Journal of Political Economy 94(5): 1002-1037.

Sala-i-Martin (1996) distinguishes between the concepts of β -convergence and σ -convergence. While the first one occurs when poor countries grow faster than rich ones, the second occurs within a group of countries when the variance of their per capita GDP levels tends to get smaller over time.

The third concept of convergence emphasised in the literature is the one of conditional β -convergence, which occurs in a group of countries when the partial correlation between the rate of growth and the initial level of per capita real income is negative.

This implies that countries reach different steady states, and therefore, after controlling for the determinants of the respective steady states, convergence should be found.

In this section, the presence of both the unconditional and conditional convergence processes is tested for the four samples of countries under study. The main assumptions underlying the analysis are the following:

- Lower income countries have similar fixed savings rates as richer ones.
- Population growth rates are the same.
- Countries have access to an identical international production function.

Since variations in any of these yield different predicted levels of steady-state income per capita, a test for "conditional convergence" that examines whether per capita income levels converge after adjusting for differences in investment/GDP ratios and population growth rates is also performed.

3.2 The model specification

Based on Mankiw, Romer and Weil (1992), the regression used to perform the convergence analysis is:

$$\begin{aligned}\log(y(t)) - \log(y(0)) &= \left(1 - e^{-\lambda t}\right)\frac{\alpha}{1-\alpha-\beta}\log(s_k) \\ &+ \left(1 - e^{-\lambda t}\right)\frac{\beta}{1-\alpha-\beta}\log(s_h) - \left(1 - e^{-\lambda t}\right)\frac{\alpha+\beta}{1-\alpha-\beta}\log(n+g+\delta) - \left(1 - e^{-\lambda t}\right)\log(y(0))\end{aligned} \tag{8}$$

As indicated in equation (8), within the Solow model, the growth of income is a function of the determinants of the ultimate steady state and the initial level of income.

The equation has the advantage of taking into account the dynamics out of the steady state. It should be noted that if countries have differences in their production

functions, the results could potentially be biased against finding convergence. Section 4 will lead with this specific problem.

The λ coefficient (the rate of convergence to a country's steady state) represents a measure of how fast countries attain their long-run equilibrium path. The measure is defined by:

$$(9) \qquad \frac{d \log y(t)}{dt} = \lambda[\log y^* - \log y(t)]$$

where y^* is the steady-state level of income per capita and $y(t)$ is the actual value at time t.

The convergence rate is related to the other variables by the following expression:

$$(10) \qquad \lambda = (n + g + \delta)(1 - \alpha - \beta)$$

The next section estimates the speed of the rate of convergence to the steady state for the four different samples of countries.

3.3 Tests for unconditional convergence

Table 3 reproduces the estimation of the unconditional β-convergence analysis. A negative log(Y) coefficient would imply that, taken two countries with the same rates of investment and the same efficiency level, the poorer one will grow faster.

TABLE 3

Tests for unconditional convergence

Dependent variable: log difference GDP per capita 1998-1960 for the Non-oil and Intermediate samples and 1998-1950 for the OECD and Latin America samples

Sample: Observations:	Non-oil 95	Intermediate 74	OECD 23	Latin America 20
Constant	-1.011* (0.605)	0.014 (0.661)	6.499* (0.755)	3.210* (1.766)
Log (Y)	0.208* (0.077)	0.095 (0.082)	-0.598* (0.088)	-0.313 (0.225)
$\bar{R}^2$	0.06	0.00	0.67	0.05
s.e.e.	0.639	0.595	0.232	0.393
Implied λ	-0.0050	-0.0024	0.0190	0.0078

Note 1: standard errors are in parentheses.
Note 2: * significant at the 5% level.
Note 3: ** significant at the 10% level.
Note 4: Y is GDP per working-age person in 1960 for the Non-oil and Intermediate samples and in 1950 for the OECD and Latin America samples.

Since the relatively poor economies must have lower stocks of physical and human capital, the marginal product of extra capital should be higher and for a given rate of investment, their growth should be faster.

Table 3 shows that only for the OECD sample there is a significant tendency towards unconditional convergence. For these countries, incomes tend to converge as predicted by the Solow model. The fit of the regression of 0.67 and the fact that the coefficient of log(Y) is negative and significant at the 5% significance level indicates so.

For the rest of the samples, the adjusted R^2 is close to zero and the coefficient on the initial level of income per capita is even positive for the non-oil and intermediate countries.

The overall fit of the regression for the OECD sample implies a substantially higher figure than the 0.46 found by Mankiw, Romer and Weil (1992). This fact, added to the lack of convergence findings for the rest of the samples could be a simple proof of Quah's "Twin Peaks" hypothesis: different convergence clubs exist, where the poor get poorer and the rich richer.[7]

3.4 Tests for conditional convergence

Table 4 reports the regression of the β -convergence equation, after controlling for two of the determinants of the steady state: investment and growth of the population.

By controlling for investment and growth of the population, convergence results change dramatically: not only the $\bar{R}^2$ s of the models improve, but also the log(Y) coefficients estimated for the four samples are now negative and statistically significant. The evidence for conditional convergence is strong and in comparison with the previous unconditional convergence findings, the fit of the regressions is substantially improved.

The speed of convergence is greater for the OECD and Latin American countries than for the first two samples. However, the values remain lower than the ones predicted by Solow (1956).

[7] Quah, D. (1996) 'Twin Peaks: Growth and Convergence in Models of Distribution Dynamics', The Economic Journal 106: 1045-1055.

TABLE 4

Tests for conditional convergence

Dependent variable: log difference GDP per capita 1998-1960 for the Non-oil and Intermediate samples and 1998-1950 for the OECD and Latin America samples

Sample: Observations:	Non-oil 95	Intermediate 74	OECD 23	Latin America 20
Constant	-0.002 (1.167)	0.844 (1.183)	4.329* (1.977)	0.247 (2.381)
Log (Y)	-0.303* (0.085)	-0.338* (0.088)	-0.602* (0.074)	-0.516* (0.212)
Log (I/GDP)	0.706* (0.090)	0.748* (0.116)	0.417* (0.239)	0.300** (0.203)
Log ($n+g+\delta$)	-1.674* (0.489)	-1.507* (0.484)	-0.985* (0.581)	-1.960* (0.884)
$\bar{R}^2$	0.49	0.45	0.77	0.28
s.e.e.	0.471	0.441	0.197	0.342
Implied λ	0.0095	0.0109	0.0192	0.0151

Note 1: standard errors are in parentheses.
Note 2: * significant at the 5% level.
Note 3: ** significant at the 10% level.
Note 4: Y is GDP per working-age person in 1960 for the Non-oil and Intermediate samples and in 1950 for the OECD and Latin America samples.
Note 5: The investment and population growth rates are averages for the period 1960-1998 for the Non-oil and Intermediate samples and for the period 1950-1998 for the OECD and Latin American samples.
Note 6: ($g+\delta$) is assumed to be 0.05.

3.5 Tests for conditional convergence with human capital

Table 5 shows that by including the proxy for human capital variable to our previous specification, the fit of the four regressions improves and the coefficients on the initial levels of income are lowered.

TABLE 5

Tests for conditional convergence with human capital

Dependent variable: log difference GDP per capita 1998-1960 for the Non-oil and Intermediate samples and 1998-1950 for the OECD and Latin America samples

Sample: Observations:	Non-oil 95	Intermediate 74	OECD 23	Latin America 20
Constant	2.208* (1.265)	2.299** (1.434)	5.458* (2.383)	3.544 (3.606)
Log (Y)	-0.460* (0.092)	-0.450* (0.108)	-0.695* (0.132)	-0.634* (0.231)
Log (I/GDP)	0.483* (0.106)	0.591* (0.145)	0.331 (0.261)	0.168 (0.228)
Log ($n+g+\delta$)	-1.650* (0.461)	-1.523* (0.477)	-1.027* (0.587)	-1.514** (0.947)
Log (human)	0.415* (0.118)	0.287* (0.164)	0.224* (0.260)	0.476 (0.395)
$\bar{R}^2$	0.55	0.47	0.76	0.30
s.e.e.	0.443	0.435	0.198	0.338
Implied λ	0.0162	0.0125	0.0247	0.0209

Note 1: standard errors are in parentheses.
Note 2: * significant at the 5% level.
Note 3: ** significant at the 10% level.
Note 4: Y is GDP per working-age person in 1960 for the Non-oil and Intermediate samples and in 1950 for the OECD and Latin America samples.
Note 5: the investment and population growth rates are averages for the period 1960-1998 for the Non-oil and Intermediate samples and for the period 1950-1998 for the OECD and Latin American samples.
Note 6: ($g+\delta$) is assumed to be 0.05.
Note 7: human is the average schooling years for the population over age 15 for the period 1960-1998.

However, the results for the Latin American sample are not so impressive. The fit of the regression improves only marginally, and the saving and human variables are not statistically significant.

Finally, in Table 6, the estimation of equation (10) imposing the restriction that the coefficients on $\log(s_k), \log(s_h)$ and $\log(n+g+\delta)$ sum to zero is shown.

The restriction is now not rejected in any of the four samples. However, in opposition with the previous estimation, only for the non-oil sample the coefficients of the explanatory variables are all statistically significant.

TABLE 6

Tests for conditional convergence, restricted regression

Dependent variable: log difference GDP per capita 1998-1960 for the Non-oil and Intermediate samples and 1998-1950 for the OECD and Latin America samples

Sample: Observations:	Non-oil 95	Intermediate 74	OECD 23	Latin America 20
Constant	3.827* (0.731)	3.695* (0.903)	6.785* (1.201)	5.908* (1.900)
Log (Y)	-0.411* (0.087)	-0.412* (0.104)	-0.708* (0.128)	-0.632* (0.228)
Log (I/GDP) – Log ($n+g+\delta$)	0.508* (0.105)	0.634* (0.142)	0.425* (0.213)	0.157 (0.224)
Log (human) – Log ($n+g+\delta$)	0.438* (0.118)	0.313 (0.164)	0.250 (0.253)	0.655* (0.317)
$\bar{R}^2$	0.54	0.47	0.77	0.31
s.e.e.	0.447	0.436	0.195	0.333
		Test of restriction		
p-value	0.122	0.215	0.525	0.450
Implied λ	0.0139	0.0140	0.0256	0.0208

Note 1: standard errors are in parentheses.
Note 2: * significant at the 5% level.
Note 3: ** significant at the 10% level.
Note 4: Y is GDP per working-age person in 1960 for the Non-oil and Intermediate samples and in 1950 for the OECD and Latin America samples.
Note 5: the investment and population growth rates are averages for the period 1960-1998 for the Non-oil and Intermediate samples and for the period 1950-1998 for the OECD and Latin American samples.
Note 6: ($g+\delta$) is assumed to be 0.05.
Note 7: human is the average schooling years for the population over age 15 for the period 1960-1998.

The previous analysis demonstrates that for three of the four samples there is strong evidence of conditional convergence. The results imply that when a regression

that controls for the determinants of steady states is estimated, the initial income coefficient takes a negative sign.

For the OECD countries, this process can be interpreted as the closing of the productivity gap as one of the sources of economic growth in the period after the World War II. In this sense, departures from the steady state represent for this sample a larger share of cross-country variation in income per capita.

As described by Howard Pack (1999) to explain the high growth rates of the OECD countries after the World War II: 'many analysts have augmented the simple production function to include not only investment in physical and human capital, but also changes in measured R&D levels, the effects of environmental and safety regulation.'[8]

Therefore, the convergence phenomenon could have been a result of the transfer of knowledge arising from extensive trade in products, direct foreign investment among OECD countries and technology license agreements. Moreover, several studies have found that the most important support for convergence comes from economies that are similar except for initial conditions.[9]

Since the "better" conditional convergence result is obtained for the OECD countries ($\bar{R}^2$ =0.77), one could question whether the convergence process is not only restricted to the free-market industrialised countries. For instance, this could be again a proof of Danny Quah's "Twin Peaks" hypothesis since for the most comprehensive sample of countries unconditional convergence is not observed.

Additionally, the fact that the conditional convergence estimation including the human capital variable does not show substantially improved results for the Latin American regions raises interesting questions regarding the role played by this variable on economic growth.

One possible explanation underlying this result could be the fact that the potential benefits of initial backwardness for some countries were not good per se. In this respect, the recent empirical endogenous growth literature argues that favourable social, political and economical conditions are crucial for a country to enjoy a rapid catch-up

[8] Pack, H. (1994) 'Endogenous Growth Theory: Intellectual Appeal and Empirical Shortcomings', *Journal of Economics Perspectives* 8(1), p. 59.
[9] Barro, R. J., N. G. Mankiw and X. Sala-i-Martin (1995) 'Capital Mobility in Neoclassical Models of Growth', The American Economic Review 85(1), p. 103.

growth. These include, among others, a stable macroeconomic policy and institutions designed to facilitate the identification and absorption of technology.

Moreover, the restriction that the coefficients on $\log(s_k)$, $\log(s_h)$ and $\log(n+g+\delta)$ sum to zero is not rejected for three of the samples studied, excluding Latin America.

In opposition to the OECD case, were departures from the steady state represent a larger share of cross-country variation in income per capita, the Latin American experience represents an exceptional case: important disparities inside the region persisted throughout the 1950-1998 period.

Finally, and even if one considers that the average rate of 2% at which the regions close the gap between their current positions and their steady states according to the model is close to what is observed, some problems remain.

In this sense, when leading with cross-sections regressions, the omission of the importance of fixed effects, the sensitivity to measurement errors and the possibility of heterogeneity bias or outliers need to be taken into account.[10]

Additionally, for the OECD and Latin American cases, the smallness of the samples could discard much of the variation in the variables of interest. In order to correct for these potential problems, the next section performs a dynamic panel data convergence analysis that permits to evaluate the consistency and relevance of the cross-section findings for the Latin American region.

4 LATIN AMERICA: A PANEL DATA CONVERGENCE ANALYSIS

4.1 A dynamic panel data model

Baltagi (1995) lists different advantages of using a panel data empirical framework:

- Individual heterogeneity is taken into consideration.
- More informative data, more variability, less collinearity and more efficiency are obtained.
- A study of the dynamics of adjustment can be performed.
- It allows the researcher to identify and measure effects that are simply not detectable in pure cross-sections or pure time-series data.

[10] Temple, J. (1999) 'The New Growth Evidence', Journal of Economic Literature 37, p. 134-135.

- More complicated behavioural models than purely cross-section or time-series data can be constructed and tested.

One of the most important critiques that followed the Mankiw, Romer and Weil's (1992) study was that the used model did not allow for differences in the aggregate production functions across economies. The country-specific aspect of the production function is correlated with the explanatory variables creating omitted variables bias in a cross-section estimation.

As argued by Islam (1995):

> Differences in preference and technology across countries have dimensions that are not readily measurable or observable. In the framework of cross-section regression, it is not possible to take account of such unobservable or unmeasurable factors. Only a panel data approach can overcome this problem.[11]

This section performs a dynamic panel-data convergence analysis for the Latin American region. The error terms are now less influenced by business cycle fluctuations and less likely to be serially correlated.

Following Islam (1995) equation (8) is introduced in the next alternative form:

$$\ln y(t_2) = (1-e^{-\lambda\tau})\frac{\alpha}{1-\alpha}\ln(s) - (1-e^{-\lambda\tau})\frac{\alpha}{1-\alpha}\ln(n+g+\delta) + e^{-\lambda\tau}\ln y(t_1) + (1-e^{-\lambda\tau})\ln A(0) + g(t_2 - e^{-\lambda\tau}t_1). \tag{11}$$

where $(1-e^{-\lambda\tau})\ln A(0)$ is the time-invariant individual country effect term.

Using the conventional notation of the panel data literature, the above equation can be specified as:

$$y_{it} = \gamma y_{i,t-1} + \sum_{j=1}^{2}\beta_j x_{it}^j + \eta_t + \mu_i + \upsilon_{it}, \tag{12}$$

where the variables are the same that were used in the previous cross-section analysis:

$$y_{it} = \ln y(t_2)$$

$$y_{i,t-1} = \ln y(t_1)$$

$$\gamma = e^{-\lambda\tau}$$

[11] Islam, N. (1995) 'Growth Empirics: A Panel Data Approach', Quarterly Journal of Economics 110(4), p. 1132.

$$\beta_1 = (1 - e^{-\lambda\tau}) \frac{\alpha}{1-\alpha}$$

$$\beta_2 = -(1 - e^{-\lambda\tau}) \frac{\alpha}{1-\alpha}$$

$$x_{it}^1 = \ln(s)$$

$$x_{it}^2 = \ln(n + g + \delta)$$

$$\mu_i = (1 - e^{-\lambda\tau}) \ln A(0)$$

$$\eta_t = g(t_2 - e^{-\lambda\tau} t_1)$$

υ_{it} is the transitory error term that varies across countries and time periods.

The individual country effect can now be effectively controlled by the panel data estimation of the above equation.[12]

4.2 The data and the sample

As in the previous section, the estimation is based on the Heston, Summers and Aten (2001) and Barro and Lee (2001) dataset.

The period of analysis is divided into seven five-year time intervals, constructing seven data points for each of the twenty Latin American countries in the sample: 1995, 1990, 1985, 1980, 1975, 1970 and 1965. Therefore, the study covers a period of analysis of 35 years.

4.3 Pooled estimation results

In order to evaluate whether dividing the growth period into seven-year spans and the impact that both differences in the sample and in the construction of variables could have in the present estimation, a pooled OLS estimation of equation (11) is firstly performed. Results are shown in Table 7.

[12] Islam, N. (1995) 'Growth Empirics: A Panel Data Approach', Quarterly Journal of Economics 110(4), pp. 1136-1137.

TABLE 7

Pooled regression from a panel of five-year span data: dependent variable is y_{it}

Sample:	Latin America
Observations:	140
Unrestricted regression	
$\ln(y_{i,t-1})$	0.8739* (0.0325)
$\ln(s)$	0.1189* (0.0297)
$\ln(n+g+\delta)$	-0.1206 (0.1207)
$\bar{R}^2$	0.89
Implied λ	0.01926
Restricted regression	
$\ln(y_{i,t-1})$	0.8741* (0.0294)
$\ln(s)-\ln(n+g+\delta)$	0.1188* (0.0296)
$\bar{R}^2$	0.89
Implied λ	0.01922
Implied α	0.485
Wald test for restriction: p-value	0.99

Note 1: standard errors are in parentheses.
Note 2: * significant at the 5% level.
Note 3: ** significant at the 10% level.

Allowing for the difference in the way the equation is specified, the coefficient on the initial level of income for the restricted regression of 0.8741 implies a value of -0.126 in the specification of Section 3. The result obtained in the previous cross-section analysis was -0.516.

The value of λ obtained both from the unrestricted and restricted pooled estimation is very similar 0.01926 and 0.01922. This implies, as expected, a small difference with respect to the 0.0151 value of λ obtained in the cross-section estimation of Section 3. Therefore, the convergence results are slightly affected by the inclusion of seven-year spans and by considering a broader period of analysis.

4.4 Estimation with fixed effects

The Least Squares with Dummy Variables estimation performed in this section assumes that the individual country effects are fixed. This assumption seems quite reasonable, since the basis for implementing the current panel data approach was precisely the presence of correlation between the "effects" and the exogenous variables. The results of the estimation with fixed effects are displayed in Table 8.

TABLE 8

LSDV estimation with fixed effects: dependent variable is y_{it}

Sample: Observations:	Latin America 140
Unrestricted regression	
$\ln(y_{i,t-1})$	0.6679* (0.0527)
$\ln(s)$	0.2370* (0.0509)
$\ln(n+g+\delta)$	-0.0519 (0.2142)
$\bar{R}^2$	0.87
Implied λ	0.05766
Restricted regression	
$\ln(y_{i,t-1})$	0.6481* (0.0479)
$\ln(s)-\ln(n+g+\delta)$	0.2413* (0.0506)
$\bar{R}^2$	0.89
Implied λ	0.0619
Implied α	0.407
Wald test for restriction: p-value	0.36

Note 1: standard errors are in parentheses.
Note 2: * significant at the 5% level.
Note 3: ** significant at the 10% level.

The panel estimation allowing for correlated individual effects leads to considerable changes in the previous results. The implied value of λ is higher (0.0619), being very close to the corresponding rate of convergence estimated by Islam (1995) for the OECD countries (0.0670). Moreover, and in spite of using a different empirical methodology, the results are very close to the findings of Dobson and Ramlogan (2002) for the Latin American region.

The estimate of the output elasticity parameter α is lower than in the pooled estimation, being its value close to the one derived from the data on factor shares (0.33).

Therefore, the inclusion of individual country effects has a significant impact over the growth regression results.

4.5 Introducing human capital

In this section, the extent to which the inclusion of the human capital dimension affects the panel estimation results is determined. In what direction does this variable affect the previous conditional convergence predictions?

The restricted form of the equation estimated in this section is:

$$\ln y(t_2) = (1-e^{-\lambda\tau})\frac{\alpha}{1-\alpha}[\ln(s) - \ln(n+g+\delta)] + (1-e^{-\lambda\tau})\frac{\varphi}{1-\alpha}\ln(h^*) + e^{-\lambda\tau}\ln y(t_1) + (1-e^{-\lambda\tau})\ln A(0) + g(t_2 - e^{-\lambda\tau}t_1), \quad (13)$$

where the included h^* variable represents the steady state level of human capital and φ is the exponent of human capital in the augmented production function of Mankiw, Romer and Weil (1992).[13]

The results of the estimation of equation (13) are shown in Table 9 both for the pooled OLS and for the panel specifications.

TABLE 9

Estimation with human capital

Variable	Pooled Regression	Panel Estimation
$\ln(y_{i,t-1})$	0.8787* (0.0355)	0.6078* (0.0625)
$\ln(s) - \ln(n+g+\delta)$	0.1202* (0.0302)	0.2498* (0.0513)
$\ln(h)$	-0.0103 (0.0424)	0.0649 (0.0645)
Implied λ	0.0185	0.0711
Implied α	0.498	0.389
Implied φ	-0.043	0.101
$\bar{R}^2$	0.89	0.86

Note 1: standard errors are in parentheses.
Note 2: * significant at the 5% level.
Note 3: ** significant at the 10% level.

For the panel estimation, the inclusion of the human capital variable leads to higher rates of convergence and lower values of α.

However, as in Islam (1995), the human capital variable is not statistically significant.

What can be concluded from these "anomalous results" regarding the Latin American region? Does human capital play a key role in the growth process?

As argued by Pack (1994):

> Tests of the neo-classical growth framework will not, in and of themselves, prove very much about the value of the endogenous growth theory. The challenge for empirical

[13] Islam, N. (1995) 'Growth Empirics: A Panel Data Approach', Quarterly Journal of Economics 110(4), p. 1150.

work is to test the implications of the new theory more directly. In practice, this means testing its insights against the economic evolution of individual countries.[14]

Taking this perspective, the next section is devoted to the analysis of one of Latin America's individual country economic evolution: the 1950-2000 Uruguayan growth process.

5 AN ECONOMIC TRUNCATED GROWTH: THE CASE OF URUGUAY

5.1 Statement of the problem

Until the Great Depression of the 1930s, Uruguayan economic growth was largely based on exports of primary commodities. In this respect, the country shared the experience of the Scandinavian and Eastern European regions, Australia, Canada, New Zealand and South Africa.

Already before the 1929 crisis, and after thirty years of intensive economic growth, its average income level exceeded that of Austria, Finland, Italy and Japan, and approaches that of France. By 1950, as can be seen in Table 10, the country maintained a comparatively high per capita income.

TABLE 10

1950 Real GDP per capita

Brazil	1,696
Chile	3,391
Mexico	2,295
Peru	2,499
Uruguay	**5,405**
Austria	1,044
Finland	4,943
France	5,573
Spain	2,638
Korea	1,337
Taiwan	991

Source: Heston, A., R. Summers and B. Aten (2001) Penn World Table Version 6.0. Center for International Comparisons at the University of Pennsylvania (CICUP), December 2001.

Considering the successful growth experience of the East Asian Tigers throughout the last fifty years, it is interesting to observe that by 1950, the real GDP per capita of the Republic of Korea and Taiwan represented respectively the 25% and 18% of the Uruguayan one.

[14] Pack, H. (1994) 'Endogenous Growth Theory: Intellectual Appeal and Empirical Shortcomings', Journal of Economic Perspectives 8(1), p. 70.

In spite of the positive signs during the 1950s regarding Uruguay's potential for continued growth, fifty years of poor economic dynamism followed. As Favaro and Spiller (1991) argue:

> The post-war history of Uruguay took Uruguayans and foreign observers alike by surprise. This small country, with a well-educated and stable population of just above 2 million in the 1940s, enjoying a relatively high standard of living, was expected to achieve the dream of becoming the "Switzerland" of South America. Instead, Uruguay's experience during the second half of this century has been one of stagnation, inflation, and instability, not very different, in a sense, from the other Latin America countries.[15]

The stagnation was so dramatic not only with respect to countries similarly endowed with rich land, but also with respect to some Latin American countries which suffered severe social, political and institutional crises and were affected by different natural disasters. In comparison terms, Uruguay was the one that registered the lowest economic growth rate.

Figures in Table 11 reflect this phenomenon.

The Uruguayan 1.7% GDP growth rate was the lowest of the region. Moreover, a striking feature is constituted by the fact that the other "poor-performance countries" grew at an average that doubled this figure (Argentina, Bolivia, Nicaragua and Panama).

TABLE 11

GDP growth rates 1945-1996 (%)

Argentina	3.0
Bolivia	2.9
Brazil	6.1
Chile	3.6
Colombia	4.9
Costa Rica	5.4
Dominican Republic	5.2
Ecuador	5.1
El Salvador	3.6
Guatemala	4.3
Honduras	3.8
Mexico	5.2
Nicaragua	3.0
Panama	3.0
Paraguay	4.7
Peru	3.7
Uruguay	**1.7**
Venezuela	4.2

Source: Thorp, R. (1998) Progress, Poverty and Exclusion. An Economic History of Latin America in the 20th Century. Washington D.C.: Inter-American Development Bank, p. 318.

[15] Favaro, E. and P. T. Spiler (1991) 'Uruguay', in Papageorgiou, D., M. Michaely and A. M. Choksi (eds) (1991) Liberalizing Foreign Trade – Volume 1 – The Experience of Argentina, Chile and Uruguay. Cambridge: Basil Blackwell, p. 328.

5.2 Factors underlying the Uruguayan economic growth performance

Since the 1960s, different comprehensive and formal analyses have been performed to determine the reasons behind the poor growth performance registered by the Uruguayan economy.

The most ambitious approaches are CIDE (1965), Instituto de Economía (Institute of Economics) (1969), Anichini, Caumont and Sjaastaad (1977), CINVE (1984), Astori (1986), Rama (1991) and Olesker (2001).

In general terms, some of these studies emphasise the consequences that internal policy related factors had on the economic structure: inflation, fiscal deficits, rent seeking behaviour and corruption.

Others adopt a more "external causality approach". Mainly adopting the Marxist and the Dependency theoretical frameworks, factors that historically could not be controlled by the LDCs are analysed: pattern of deterioration in the commodities terms of trade, Uruguay's geographic position in an unstable region and recurrent increases in oil prices among others.

However, from a comparative perspective, as it is well known, these factors also affected other LDCs (and in many cases even more severely).

Are the theories of growth useful in analysing the Uruguayan growth experience? Does the country emerge as an economic growth paradox?

5.3 The neo-classical approach

In this section, the neo-classical growth framework is introduced as the basis for the study of the Uruguayan growth experience from a Latin American comparative perspective.

The first step is to determine whether the country can be considered as an outlier in the Solow model estimation of Section 2. To test this hypothesis, an Uruguayan dummy variable was included in both the traditional and augmented specifications (see Appendix 3). Results show that the included dummy is not statistically significant.

Therefore, from this first empirical analysis it could be concluded that Uruguay's growth seems to be accounted by the neo-classical model and does not constitute an atypical case.

Given these results, two joint hypotheses are formulated:

1) Uruguay reached its steady state in the 1950s

2) A lack of technological progress impeded the attainment of a long-run growth process with increasing growth rates

According to the data already analysed, and given the neo-classical definition of steady state, the first hypothesis seems to be consistent with the Uruguayan GDP growth evolution.

In 1998, Fajnzylber and Lederman performed a growth-accounting exercise to determine the extent to which the total factor productivity of the Latin American and Caribbean countries had been affected by the market-oriented economic reforms policies implemented during the 1980s. In doing so, they collected Latin American data on physical capital stocks, working-age population and GDP for the 1950-1995 period.

Their empirical specification is:

$$(14) \qquad \frac{\dot{Y}}{Y} = \alpha \frac{\dot{K}}{K} + (1-\alpha)\frac{\dot{L}}{L} + \frac{\dot{B}}{B}$$

where output growth is equal to a weighted average of capital and labour growth plus the growth rate of technological progress.

TABLE 12

Growth decomposition 1950-1995 (in percent)

Country	GDP growth (1)	Capital (2)	Labor (3)	Productivity (4)	(4)/(1)
Argentina	2.2	1.2	0.8	0.2	9
Bolivia	2.4	1.2	1.4	-0.2	-10
Brazil	5.1	2.4	1.7	1.0	19
Chile	3.5	1.3	1.4	0.8	24
Colombia	4.5	1.8	1.8	0.9	21
Costa Rica	5.0	2.5	2.2	0.3	6
Ecuador	4.8	1.9	1.8	1.0	22
El Salvador	3.5	2.1	1.5	0.0	-1
Guatemala	3.8	1.8	1.8	0.2	5
Honduras	3.8	1.9	1.7	0.2	5
Jamaica	2.7	1.3	0.8	0.7	25
Mexico	4.6	2.6	1.8	0.3	-5
Nicaragua	2.3	2.0	1.9	-1.6	-69
Paraguay	4.2	2.7	2.0	-0.4	-10
Peru	3.5	1.5	1.5	0.5	-14
Uruguay	1.8	0.4	0.4	1.0	54
Venezuela	3.3	1.4	2.2	-0.3	-10
Average	3.5	1.7	1.6	0.2	5

Source: Fajnzylber, P. and D. Lederman (1998) 'Economic Reforms and Total Factor Productivity Growth in Latin America and the Caribbean, 1950-95: An Empirical Note', World Bank Working Paper (March).

If Uruguay reached its steady state in the 1950s, according to the Solow model where long-run growth of output per worker depends only on technological progress, a

lack of it could be one of the explanations behind the growth failure experience. Fajnzylber and Lederman's growth decomposition estimation is reported in Table 12.

Between 1950 and 1995, Latin American countries' average GDP growth rate was 3.5%. Capital accumulation, population growth and productivity explained respectively the 50%, 45% and 5% of it. Consistently with this paper's computations obtained from the Penn World Table's data, Uruguay registered the lowest growth rate of the region (1.8%).

A positive correlation between output and productivity growth is observed, confirming the traditional neo-classical hypothesis: in the long run the source of variation in the growth rate of income per capita is positively related with the rate of increase in the effectiveness of labour.

However, is the neo-classical theory relevant to the Uruguayan growth performance over the period? Figures show that the contribution of productivity growth to GDP was 54%, by far the highest figure for the region.

Moreover, the country shares with Brazil, the South American industrial giant, and Ecuador, the highest rate of increase in productivity. However, its effect on the GDP is substantially different. Brazil and Ecuador, with respectively the 5.1% and 4.8% increase in their GDP growth rate, were the countries that registered some of the higher growth rates of the region.

From the neo-classical growth theory perspective the analysis of the reasons behind the Uruguayan stunted growth performance reflects a striking paradox: one of the countries with the comparative highest rate of increase in the rate of technological progress is the one with the lowest GDP growth rate of the period.

In this sense, and while the previous sections showed the usefulness of the Solow model in explaining world-wide income differences across countries, when confronted with the historical growth evolution of an individual country, its "predictive power" is severely undermined.

5.4 The endogenous approach

After having evaluated the empirical implications of the Solow model, this section's objective is to determine the extent to which the modern growth theory can account for the Uruguayan experience. The role that social and political factors play in the determination of a country's GDP growth rate is evidenced by the most recent studies in the field:

- For Alesina and Perotti (1996), 'income inequality and investment are inversely related. Since investment is a primary engine of growth, this paper identifies a channel for an inverse relationship between income inequality and growth.'[16]
- Knack and Keefer (1997) argue that trust and civic co-operation have significant impacts on aggregate economic activity.
- For Easterly and Levine (1997), poor rates of economic growth are mainly associated with high ethnic fragmentation. In this sense, they argue that 'explaining cross-country differences in growth rates requires not only an understanding of the link between growth and public policies, but also an understanding of why countries choose different public policies.'[17] For them, ethnic diversity explains in a great extent the differences found in cross-country public policies and other economic indicators.
- Temple and Johnson (1998), argue that "social capability" is one of the main determinants of economic growth. In order to study the interaction between political, social arrangements and economic growth, they made use of an index of socio-economic development. Their argument is that many predictions regarding economic growth went wrong because 'researchers sought the origins of long-run growth in the wrong places.'[18]
- In a recent empirical study regarding the impact of governance on economic growth and development, Kaufmann, Kraay and Zoido-Lobatón (1999) find a strong causal relationship from better governance to better development outcomes.
- Easterly (2000) affirms that 'relatively homogenous middle-class societies have more income and growth, because they have more human capital and infrastructure accumulation, they have better national economic policies, more democracy, less political instability, and more urbanization.'[19]

[16] Alesina, A. and R. Perotti (1996) 'Income Distribution, Political Instability, and Investment', European Economic Review 40, p. 1203.
[17] Easterly, W. and R. Levine (1997) 'Africa's Growth Tragedy: Policies and Ethnic Divisions', Quarterly Journal of Economics 112(4): 1203-1250, p. 1203.
[18] Temple, J. and P. A. Johnson (1998) 'Social Capability ad Economic Growth', Quarterly Journal of Economics 113 (3), p. 965.
[19] Easterly, W. (2000) 'The Middle Class Consensus and Economic Development', World Bank Working paper (December), p. 28.

- Finally, Keefer and Knack (2001) argue that 'social polarisation reduces the security of property and contract rights and, through this channel, reduces growth.'[20] Their findings are that social polarisation in the form of income inequality, land inequality and ethnic tensions is inversely related with the security level of contractual and property rights.

In evaluating the extent to which this new empirical evidence can account for the observed Uruguayan economic growth process, and consistently with its main predictions, two hypotheses are formulated and subsequently analysed:

1) Uruguay did not have in the 1950s the so-called "positive initial conditions" to register a sustainable path of high economic growth.
2) If hypothesis 1 does not hold, throughout the second half of the century the country could have registered an important deterioration in its main socio-political institutions, which can account for the observed growth failure phenomenon.

5.5 Historical background

Uruguay can be defined as a small, ethnically and linguistically homogenous country. According to Spektorowski (2000), these factors implied that:

> Uruguay's politics were not marked by the regional and communal rivalries that rent most of Latin America.… the capital city quickly conquered the countryside and by 1880 the Uruguayan entrepreneurial landowners were not longer in control of the institutions of government.…the parties provided almost the only organisational structure that could both keep the rural poor at bay and grant its leaders direct access to the government.… the distinctive process in the growth of the Uruguayan party system is that it grew out of political armies.[21]

Regarding the human capital variable which has an important incidence in development outcomes, already by the 1950s, the country had more than 90% of adult literacy rate with the primary, secondary and technical schools and the National University been gratuitous and open for every citizen.

In this respect, considering both the East Asian Tigers' "economic miracle" and the importance that the new theories of growth give to human capital accumulation, it is interesting to compare the Uruguayan enrolment figures in 1960 with respect to the ones of Korea, Singapore and Taiwan (Table 13).

[20] Keefer, P. and S. Knack (2001) 'Polarization, Politics and Property Rights. Links between Inequality and Growth', World Bank Working paper (December), Abstract.

TABLE 13

Enrolment in secondary schools 1960
(as a % of the respective age cohorts)

Argentina	23
Brazil	11
Chile	24
Ecuador	12
Mexico	11
Peru	15
Uruguay	**37**
Spain	23
Turkey	14
Korea	27
Singapore	32
Taiwan	30

Source: Balassa, B., G. M. Bueno, P. P. Kuczynski, y M. H. Simonsen (1986) Toward Renewed Economic Growth in Latin America. Washington D.C.: Institute for International Economics, p. 46

As can be seen, capturing a variable commonly used in the empirics of economic growth to account for the level of human capital reached by a nation, Uruguay was in the 1960s in an overall better position than the East Asian countries.

In 1962, a French historian, Marcel Niedergang, commented about the country's demographic characteristics: 'With 0.8% mortality rate is the lowest of all Latin America. The birth rate (2%) is low, being another proof of the high quality living standards of the Uruguayans.'[22] During the whole past century, according to international standards, the rate of population growth was similar to that of Western Europe: 1.7% between 1908 and 1963, and 0.6% between 1963 and 1975.[23]

Therefore, according to the modern growth theory where ethnic, social and political initial conditions play a key role on economic growth, the evidence contradicts the first hypothesis formulated: the GDP growth figure registered during the second half of the twentieth century was exactly the opposite of what was expected.

5.6 A growth paradox?

In this section, the second endogenous hypothesis is tested by analysing the "growth-related socio-economic factors" for our country case and by discussing the in

[21] Spektorowski, A. (2000) 'Nationalism and Democratic Construction: The Origins of Argentina and Uruguay's political cultures in comparative perspective', Bulletin of Latin American Research 19: 81-99.
[22] Niedergang, M. (1962) Les Vingt Amériques Latines. Paris: Librairie Plon, p.112.
[23] Favaro, E. and P. T. Spiler (1991) 'Uruguay', in Papageorgiou, D., M. Michaely and A. M. Choksi (eds) (1991) Liberalizing Foreign Trade – Volume 1 – The Experience of Argentina, Chile and Uruguay. Cambridge: Basil Blackwell, p. 336.

teractions within the main Uruguayan social indicators and the country's growth rate between 1950 and 2000.

Given that in spite of the exceptional initial socio-political advantages, the country failed to grow, the alternative hypothesis is to stress that from a Latin American comparative perspective, a strong deterioration in Uruguay's social and political structures throughout the period of the analysis must have occurred.

Two of the variables that play a key role in the process of achieving sustained and high growth rates are the level of inequality and poverty. Table 14 presents the evolution of these Uruguayan figures in a regional perspective.

TABLE 14

Uruguay socio-economic indicators in a Latin American comparative perspective

	Population growth (in %) 1950-70		1970-95		Illiteracy rate 1995		Life expectancy 1995		Gini coefficients 1995		HDI 2001		HPI Ranking 2001	
ARG	1.7	(2)	1.5	(2)	3.8	(2)	72	(5)	0.54	(7)	34	(1)	-	
BOL	2.2	(3)	2.3	(6)	16.9	(13)	60	(18)			104	(15)	16.4	(12)
BRA	3.0	(14)	2.1	(4)	16.7	(12)	66	(13)	0.63	(8)	69	(9)	12.9	(10)
CHL	2.3	(4)	1.6	(3)	4.8	(3)	75	(2)	0.52	(5)	39	(3)	4.2	(3)
COL	3.1	(10)	2.5	(8)	8.7	(6)	70	(8)	0.50	(4)	62	(8)	9.1	(6)
CRI	3.9	(18)	2.8	(13)	5.2	(4)	77	(1)	0.42	(3)	41	(4)	4.0	(2)
DOM	3.2	(15)	2.7	(12)	17.9	(14)	70	(9)			86	(13)	14.4	(11)
ECU	2.9	(8)	2.6	(10)	9.9	(9)	69	(11)			84	(12)	16.8	(13)
GTM	3.2	(15)	2.8	(13)	36.0	(18)	66	(17)			108	(18)	23.8	(17)
HND	3.1	(10)	3.1	(16)	29.9	(17)	68	(12)			107	(17)	20.8	(15)
MEX	3.1	(10)	2.4	(7)	10.4	(10)	72	(7)	0.53	(6)	51	(5)	9.5	(7)
NIC	2.8	(7)	3.3	(18)	25.8	(16)	67	(16)			106	(16)	23.3	(16)
PAN	2.9	(8)	2.5	(8)	9.2	(8)	73	(4)			52	(6)	8.5	(4)
PER	2.5	(6)	2.6	(10)	11.3	(11)	67	(14)			73	(10)	12.9	(9)
PRY	2.4	(5)	3.2	(17)	7.9	(5)	69	(10)			80	(11)	10.2	(8)
SLV	3.1	(10)	2.1	(4)	23.7	(15)	69	(15)			95	(14)	18.3	(14)
URY	1.0	(1)	0.7	(1)	2.7	(1)	73	(3)	0.38	(1)	37	(2)	4.0	(1)
VEN	3.8	(17)	2.9	(15)	8.9	(7)	72	(6)	0.40	(2)	61	(7)	8.6	(5)

Sources:
1) Thorp, R. (1998) Progress, Poverty and Exclusion – An Economic History of Latin America in the 20th Century. Washington: Inter-American Development Bank.
2) United Nations Development Programme (2001) Human Development Report – Making New Technologies Work for Human Development. New York: Oxford University Press.

The 1995 and 2001 figures from a selected set of social indicators, show that, after fifty years, Uruguay continues to clearly differentiate itself from the rest of Latin America: the Gini coefficient and the Human Poverty Index are the lowest of the region. In addition to that, its population growth and illiteracy rates are also the lowest, while its life expectancy is the highest.

The UNDP "Human Development Report 2001" considers Uruguay as a High Human Development country (Human Development Index: rank 37 for a 162-country sample).

According to the ECLAC 1998 figures, inequality measured by the quotient between the average income of the richest 10% and the poorest 40% was equal to 4.7, while being of 9.6 for Argentina, 11.8 for Chile and 16.8 for Brazil. Poverty, measured by the percentage of households below the poverty line was 6% for Uruguay, 13% for Argentina, 19% for Chile, 25% for Brazil, reaching 50% for the Ecuadorian case.[24]

Kaztman, Filgueira and Furtado (2000) affirm that 'the good relative performance of Uruguay in the sphere of social justice has its counterpart in the legitimacy that the country's citizens attribute to its democracy and institutions'. By 1995, and after one dictatorship and fifty years of economic stagnation, 86% of Uruguayans considered that "democracy is preferable to any other form of Government" and 77% considered that "the way you vote can make things different in future."[25]

Regarding Kaufmann, Kraay and Zoido-Lobatón (1999) argument of a causal relationship between governance and development outcomes, the Uruguayan governance indicators are further analysed. Governance is defined as the traditions and institutions by which authority in a country is exercised. From the six aggregate measures that capture the various dimensions of governance, three of them where selected to compare Uruguay within the Latin American region.

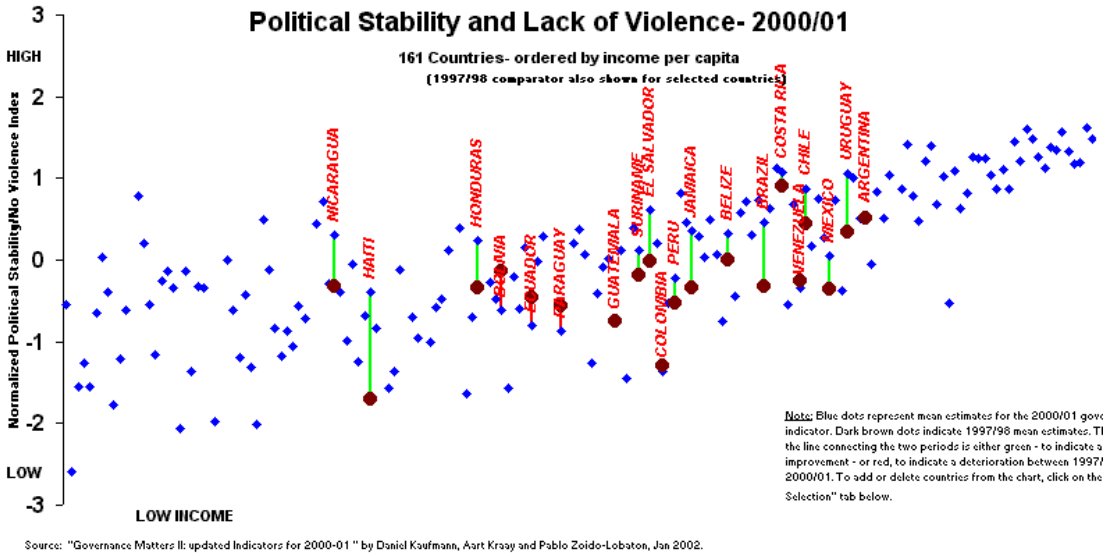
By 2001, Costa Rica and Uruguay had the highest political stability and lack of violence index, reflecting that the process by which governments are selected, monitored and replaced was strongly institutionalised within these two societies (Figure 1).

Figure 2 reflects the comparatively higher capacity of the Uruguayan government to effectively formulate and apply policies, as reflected by the Government Effectiveness index 2000-2001.

Finally, as Figure 3 shows, the Rule of Law index for 2000-2001 also reflects the high respect of citizens for the institutions that govern their economic and social interactions.

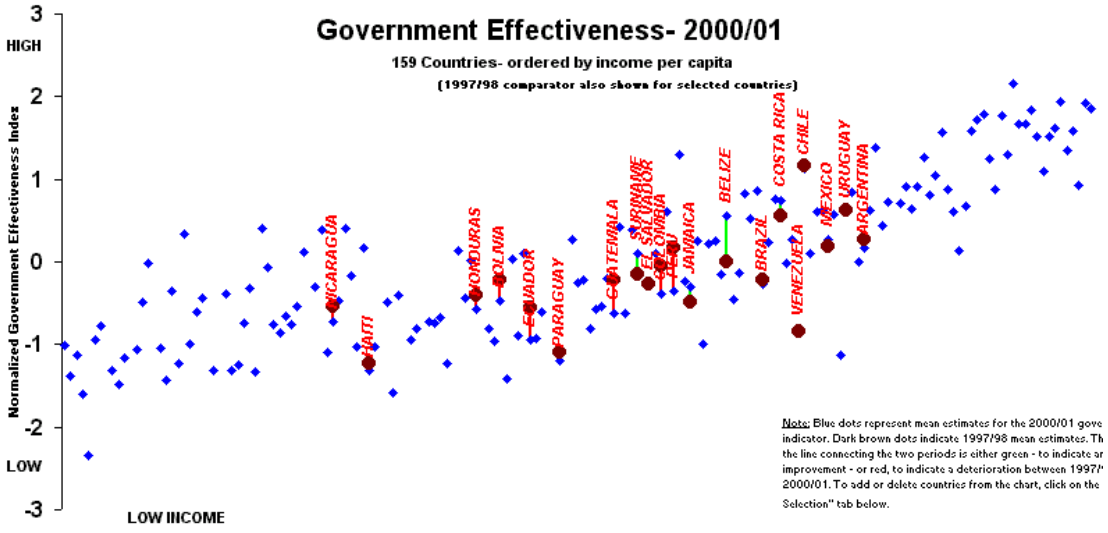
[24] ECLAC (1999) Social Panorama of Latin America, 1998. Santiago de Chile: ECLAC.
[25] Filgueira, F., M. Furtado and R. Kaztman (2000) 'New Challenges for Equity in Uruguay', CEPAL Review 72, p. 81.

FIGURE 1



Source: "Governance Matters II: updated Indicators for 2000-01 " by Daniel Kaufmann, Aart Kraay and Pablo Zoido-Lobaton, Jan 2002.

FIGURE 2



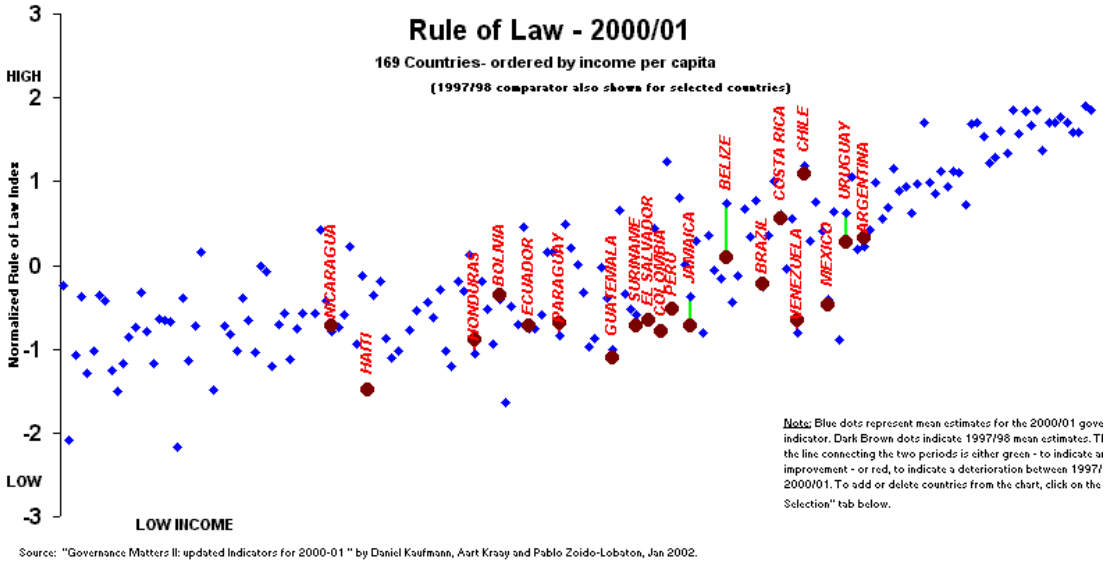
Source: "Governance Matters II: updated Indicators for 2000-01 " by Daniel Kaufmann, Aart Kraay and Pablo Zoido-Lobaton, Jan 2002.

Therefore, and given the evidence just analysed, behind Uruguay's stunted growth performance are some key factors that the new growth literature cannot fully assess. The paper claims that traditional hypotheses regarding economic growth determinants need to be reconsidered to deal with this particular experience.

As argued by Nelson and Pack (1997), in the East Asian Tigers countries, aggressive entrepreneurship supported and encouraged rapidly rising educational attainment and served to make these investments economically productive. Since the human

capital dimension was included in this paper's test of the usefulness of the endogenous approach, what can be said in this matter regarding Uruguay's human capital?

FIGURE 3



One possible explanation is the fact that from more than fifty years, the market for college graduates was almost exclusively the Government bureaucracy where population skills arguably made little contribution to economic development.

Successful entrepreneurship could have been facilitated by the growing supply of well-trained technical people. However, there should have been public or private firms in which to work or at least the opportunity to establish new ones.

However, both from the point of view of the supply from the government and the demand from citizens, education was "biased" towards the creation of lawyers, accountants, doctors, etc.

Economic and social improvement through better education was since the beginning of the XX century a common feature of the Uruguayan national identity. The poor and newly arrived European immigrants encouraged their children to pursue a university degree in order to achieve a better socio-economic status.

The effect of this strong belief in social progress through the completion of a university degree, had the negative outcome of not favouring the technical and entrepreneurial education development.

From a Schumpeterian perspective,[26] all these factors lead to a lack of effective innovative performance of the Uruguayan firms, in spite of the high acquisition of physical capital achieved during the first decades of the century. The lesson that one could learn from the Uruguayan experience is that achieving sustainable and higher rates of economic growth is not just about increasing educational attainment or participation.

Expansion of physical and educational capital per worker is an essential part of the process by which the economy incorporates modern technology into its productive structure. But accumulation without assimilation yields no return.[27]

The comparatively higher growth rates registered by the poorer Latin American countries in the long run with respect to Uruguay can be explained by different factors. From the neo-classical perspective, one explanation could be that these countries were further away from their respective steady states in the 1950s. Therefore, as a result of this phenomenon, over the last fifty years they enjoyed higher rates of growth.

However, the paper shows that an inconsistency arises in the analysis when the neo-classic prediction regarding the effect over economic growth of increases in the rate technological progress rate is tested. From a comparative perspective, the country with the highest increment in productivity was the one that registered the lowest growth rate.

From the endogenous perspective, even if Uruguay maintained comparative higher standards of living in the region, the intertemporal comparison exercise should take into account an important aspect. While Uruguay highly "invested" in social policies during the first half of the twentieth century, the rest of Latin American countries started to improve their social and institutional infrastructures much later.

Since the comparison is centred in the 1950-2000 period, the results of these "later" policies could have had a positive association with these countries' economic growth. Alternatively, with the stagnation in the overall dynamism of its economy, Uruguay could have languished in its role of regional social leader.

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[26] Economic development, Schumpeter argues, involves transferring capital from old businesses using established methods of production to businesses using new, innovative methods.

[27] The accumulation approach emphasises the role of investment in physical and human capital on economic growth. The assimilation approach stresses the importance of the entrepreneurship, innovation and learning processes that the LDCs had to go through before being able to master the new technologies adopted from the advanced industrial countries.

If one considers the actual emphasis that the international development institutions give to the role of social policies in achieving higher growth rates and better quality development outcomes, a question arises naturally. If the rest of Latin American countries attain one day higher living standards and degrees of social cohesion: what would happen to them after achieving this stage? Would they continue to grow at comparative higher rates?

Uruguay reflects an interesting and dramatic case where no balance could be reached in the long run between improved education and the creation of new employment opportunities. The long run effects of significant numbers of "well-educated" individuals in a stagnated economy are perverse: immobilisation, frustration and emigration.

International factors clearly play a fundamental role. In this particular, several considerations as the role of Uruguay and the Latin American region in the international trade system or the importance of foreign direct investment for LDCs need to be introduced both in the "theoretically candid" endogenous growth approach and in the international development discourse.

A country may invest in improving its social welfare but if given the several international market restrictions it is constrained to remain outside the world economic system, no benefits would derive from it.

6 SUMMARY AND CONCLUSIONS

6.1 Concluding remarks

This paper investigates from a comparative perspective the extent to which the different world-wide economic growth experiences of the last fifty years can be studied and assessed within the framework of both traditional and modern theories of economic growth.

Its findings are that while cross-country regressions can highlight some useful factors that are statistically correlated with economic growth, a richer understanding of the dynamics of growth at the country level is needed and requires a thorough investigation of the institutional and economic structures.

Taking a wider period of analysis than Mankiw, Romer and Weil (1992), the study shows that the Solow model accounts for a large fraction of the observed international cross-country variation in income per capita. Moreover, the endogenous ap

proach, tested by the inclusion of a proxy for the human capital dimension, augments the predicted power of the model.

Regarding what is defined as the second main prediction of the neo-classical theory of growth, the paper analyses whether both unconditional and conditional convergence occur for four different samples of countries. It shows that convergence was not an inevitable consequence of initial backwardness: poor countries are not catching up with rich ones.

The evidence does support the claim of conditional convergence among the different samples. However, when including the human capital dimension for the Latin American case, results are less consistent. In this respect, the paper attempts to overcome some of the main econometric problems that can arise in OLS estimation.

Therefore, and in addition to the cross-section analyses from which previous studies derive their results, a beginning is made towards obtaining convergence estimates based on panel data for Latin American countries. With this methodological framework, the fit of the regression is improved and the speed of the convergence rate is very similar to the one predicted by the neo-classical model.

The relevance of the analysis is highlighted by the fact that no study based on empirical evidence as the above mentioned has been made in order to explain the reasons behind Latin America and Uruguayan economic performances between 1950 and 2000. Results mark a useful departure for and are complementary to more in-depth country analyses.

Finally, by focusing on an individual country study case, it is shown that behind Uruguay's stunted growth performance are some key factors that both the traditional neo-classical growth theory and the modern growth literature cannot fully explain. In this sense, it is argued that traditional hypotheses regarding the main economic growth determinants need to be reconsidered in order to deal both with the Latin American and the Uruguayan growth experiences.

6.2 Future lines of research

Further questions remain to be answered: could national macroeconomic policies be so badly implemented to more than compensate the overall positive effect that good social conditions have on economic growth?

Future research might consider alternative empirical approaches. A study that implements a more in depth panel data or time series approach would give new insights into the subject.

By assembling a sectoral growth model of the Uruguayan economy that includes among others a labour, output, factor prices, capital growth and allocation blocks, a simulation of the effects of policy changes over time on production, expenditures and resource allocation could be performed.

Following this strategy, and considering that Uruguay is nowadays facing a large economic recession, new interesting insights could be found that contribute to the formulation of alternative economic policies that conducts the country to the sustainable economic growth path lost fifty years ago.

APPENDICES

APPENDIX 1
List of countries included in the four samples

Non-oil			
Algeria	Dominican Rep.	Madagascar	Senegal
Angola	Ecuador	Malawi	Sierra Leone
Argentina	Egypt	Malaysia	Singapore
Australia	El Salvador	Mali	South Africa
Austria	Ethiopia	Mauritania	Spain
Bangladesh	Finland	Mauritius	Sri Lanka
Belgium	France	Mexico	Sudan
Benin	Germany	Morocco	Sweden
Bolivia	Ghana	Mozambique	Switzerland
Botswana	Greece	Nepal	Syria
Brazil	Guatemala	Netherlands	Tanzania
Burkina Faso	Haiti	New Zealand	Thailand
Burundi	Honduras	Nicaragua	Togo
Cameroon	Hong Kong	Niger	Trinidad & Tobago
Canada	India	Nigeria	Tunisia
Central African Republic	Indonesia	Norway	Turkey
Chad	Ireland	Pakistan	Uganda
Chile	Israel	Panama	United Kingdom
Colombia	Italy	Papua New Guinea	United States of America
Congo, Democratic Rep. of	Jamaica	Paraguay	Uruguay
Congo, Republic of Congo	Japan	Peru	Venezuela
Costa Rica	Jordan	Philippines	Zambia
Côte d'Ivoire	Kenya	Portugal	Zimbabwe
Denmark	Korea	Rwanda	

Intermediate			
Algeria	El Salvador	Kenya	Senegal
Argentina	Ethiopia	Korea	Singapore
Australia	Finland	Madagascar	South Africa
Austria	France	Malawi	Spain
Bangladesh	Germany	Malaysia	Sri Lanka
Belgium	Greece	Mali	Sweden
Bolivia	Guatemala	Mexico	Switzerland
Botswana	Haiti	Morocco	Syria
Brazil	Honduras	Netherlands	Tanzania
Cameroon	Hong Kong	New Zealand	Thailand
Canada	India	Nicaragua	Trinidad & Tobago
Chile	Indonesia	Nigeria	Tunisia
Colombia	Ireland	Norway	Turkey
Costa Rica	Israel	Pakistan	United Kingdom
Côte d'Ivoire	Italy	Panama	United States of America
Denmark	Jamaica	Paraguay	Uruguay
Dominican Republic	Japan	Peru	Venezuela
Ecuador	Jordan	Philippines	Zambia
		Portugal	Zimbabwe

OECD		Latin America	
Australia	Japan	Argentina	Jamaica
Austria	Luxembourg	Bolivia	Mexico
Belgium	Netherlands	Brazil	Nicaragua
Canada	New Zealand	Chile	Panama
Denmark	Norway	Colombia	Paraguay
Finland	Portugal	Costa Rica	Peru
France	Spain	Dominican Republic	Trinidad & Tobago
Germany	Sweden	Ecuador	Uruguay
Greece	Switzerland	El Salvador	Venezuela
Ireland	Turkey	Guatemala	
Italy	United Kingdom	Honduras	
	United States of America		

APPENDIX 2

Estimation of the Solow model for the 1960-1985 period

TABLE 1

Estimation of the textbook Solow model

Dependent variable: log GDP per working-age person in 1985				
Sample: Observations:	Non-oil 95	Intermediate 74	OECD 23	Latin America 20
Constant	1.158 (1.375)	1.813 (1.487)	5.474* (2.673)	5.780* (2.151)
Log (I/GDP)	0.837* (0.091)	0.892* (0.138)	0.026 (0.277)	0.408* (0.206)
Log ($n+g+\delta$)	-3.347* (0.487)	-3.159* (0.512)	-1.488** (0.887)	-1.336** (0.806)
$\bar{R}^2$	0.69	0.65	0.05	0.20
s.e.e.	0.596	0.596	0.344	0.353
Restricted regression				
Constant	7.678* (0.083)	7.587* (0.122)	9.342* (0.343)	8.157* (0.146)
Log (I/GDP) – Log ($n+g+\delta$)	1.061* (0.086)	1.215* (0.121)	0.240 (0.242)	0.469* (0.199)
$\bar{R}^2$	0.61	0.58	0.00	0.19
s.e.e.	0.662	0.652	0.353	0.355
Test of restriction				
p-value	0.000	0.000	0.160	0.283
Implied α	0.51	0.55	0.19	0.32

Note 1: standard errors are in parentheses.
Note 2: * significant at the 5% level.
Note 3: ** significant at the 10% level.
Note 4: the investment and population growth rates are averages for the period 1960-1985.
Note 5: ($g+\delta$) is assumed to be 0.05.

TABLE 2

Estimation of the augmented Solow model

Dependent variable: log GDP per working-age person in 1985				
Sample: Observations:	Non-oil 95	Intermediate 74	OECD 23	Latin America 20
Constant	5.531* (1.284)	4.678* (1.564)	8.507* (1.482)	9.081* (2.977)
Log (I/GDP)	0.394* (0.098)	0.620* (0.146)	-0.070 (0.148)	0.265 (0.218)
Log ($n+g+\delta$)	-2.244* (0.427)	-2.475* (0.504)	-1.133* (0.474)	-0.576 (0.919)
Log (human)	0.683* (0.098)	0.471* (0.125)	0.814* (0.113)	0.500** (0.324)
$\bar{R}^2$	0.79	0.70	0.73	0.26
s.e.e.	0.485	0.547	0.183	0.340
Restricted regression				
Constant	8.694* (0.135)	8.358* (0.187)	9.542* (0.177)	8.564* (0.247)
Log (I/GDP) – Log ($n+g+\delta$)	0.415* (0.100)	0.716* (0.145)	-0.020 (0.128)	0.269 (0.211)
Log (human) – Log ($n+g+\delta$)	0.783* (0.092)	0.590* (0.118)	0.836* (0.108)	0.462* (0.234)
$\bar{R}^2$	0.78	0.68	0.74	0.31
s.e.e.	0.498	0.565	0.181	0.330
Test of restriction				
p-value	0.015	0.021	0.490	0.864

Note 1: standard errors are in parentheses.
Note 2: * significant at the 5% level.
Note 3: ** significant at the 10% level.
Note 4: the investment and population growth rates are averages for the period 1960-1985.
Note 5: ($g+\delta$) is assumed to be 0.05.
Note 6: human is the average schooling years for the population over age 15 for the period 1960-1985.

APPENDIX 3

Estimation of the Solow model including a dummy variable for Uruguay

TABLE 1

Estimation of the Solow model including a dummy variable for Uruguay

Dependent variable: log GDP per capita in 1998				
Sample: Observations:	Non-oil 95	Intermediate 74	OECD 23	Latin America 20
Constant	0.146 (1.560)	1.147 (1.582)	8.261* (2.832)	2.341 (3.170)
Log (I/GDP)	1.018* (0.108)	1.039* (0.149)	0.493 (0.368)	0.325 (0.236)
Log ($n+g+\delta$)	-3.907* (0.542)	-3.553* (0.550)	-0.848 (0.895)	-2.623* (1.166)
ury	0.077 (0.633)	0.087 (0.612)		0.066 (0.500)
$\bar{R}^2$	0.74	0.71	0.10	0.30
s.e.e.	0.620	0.594	0.304	0.394

Note 1: standard errors are in parentheses.
Note 2: * significant at the 5% level.
Note 3: ** significant at the 10% level.
Note 4: the investment and population growth rates are averages for the period 1960-1998 for the Non-oil and Intermediate samples and for the period 1950-1998 for the OECD and Latin American samples.
Note 5: ($g+\delta$) is assumed to be 0.05.

TABLE 2

Estimation of the augmented Solow model including a dummy variable for Uruguay

Dependent variable: log GDP per capita in 1998				
Sample: Observations:	Non-oil 95	Intermediate 74	OECD 23	Latin America 20
Constant	3.993* (1.451)	4.926* (1.576)	8.940* (2.056)	6.574* (3.679)
Log (I/GDP)	0.481* (0.125)	0.461* (0.171)	0.159 (0.277)	0.109 (0.246)
Log ($n+g+\delta$)	-2.984* (0.479)	-2.681* (0.502)	-1.086** (0.651)	-1.718** (1.179)
Log(human)	0.753* (0.121)	0.794* (0.155)	0.721* (0.165)	0.740* (0.388)
ury	-0.200 (0.535)	-0.191 (0.528)		0.013 (0.464)
$\bar{R}^2$	0.82	0.79	0.53	0.40
s.e.e.	0.521	0.510	0.220	0.365

Note 1: standard errors are in parentheses.
Note 2: * significant at the 5% level.
Note 3: ** significant at the 10% level.
Note 4: the investment and population growth rates are averages for the period 1960-1998 for the Non-oil and Intermediate samples and for the period 1950-1998 for the OECD and Latin American samples.
Note 5: ($g+\delta$) is assumed to be 0.05.
Note 6: human is the average schooling years for the population over age 15 for the period 1960-1998.

REFERENCES

Abramovitz, M. (1986) 'Catching Up, Forging Ahead, and Falling Behind', Journal of Economic History 46(2): 385-406.

Aghion, P. and P. Howitt (1998) Endogenous Growth Theory. Cambridge, Massachusetts: The MIT Press.

Alesina, A. and R. Perotti (1996) 'Income Distribution, Political Instability, and Investment', European Economic Review 40: 1203-1228.

Anichini, J., J. Caumont and L. Sjaastaad (1977) La Política Comercial y la Protección en el Uruguay [Protection and Trade Policy in Uruguay]. Montevideo: Banco Central del Uruguay.

Astori, D. (1986) Tendencias Recientes de la Economía Uruguaya [Recent Tendencies of the Uruguayan Economy]. Montevideo: Fundación de Cultura Universitaria.

Baltagi, B.H. (1995) Econometric Analysis of Panel Data. Chichester: John Wiley & Sons.

Barro, R. J. (1991) 'Economic Growth in a Cross Section of Countries', Quarterly Journal of Economics 106(2): 407-443.

Barro, R. J. and J-W. Lee (1993) 'International Comparisons of Educational Attainment', Journal of Monetary Economics 32: 363-394.

Cass, D. (1965) 'Optimum Growth in an Aggregative Model of Capital Accumulation', Review of Economic Studies XXXII: 233-240.

CINVE (1984) La Crisis Uruguaya y el Problema Nacional [The Uruguayan Crisis and the National Issue]. Montevideo: Ediciones de la Banda Oriental.

Dobson, S. and C. Ramlogan (2002) 'Economic Growth and Convergence in Latin America', The Journal of Development Studies 38(6): 83-104.

Durlauf, S. N. and D. T. Quah (1999) 'The New Empirics of Economic Growth', in Taylor, J. B. and M. Woodford (eds) Handbook of Macroeconomics Volume 1A. Amsterdam: North Holland, pp: 235-308.

Easterly, W. (2000) 'The Middle Class Consensus and Economic Development', World Bank Working Paper (December).

Easterly, W. (2001) 'The Lost Decades: Developing Countries's Stagnation in Spite of Policy Reform 1980-1998', World Bank Working Paper (February).

Easterly, W. and A. Kraay (1999) 'Small States, Small Problems? Income, Growth and Volatility in Small States', World Bank Working Paper (September).

Easterly, W. and R. Levine (1997) 'Africa's Growth Tragedy: Policies and Ethnic Divisions', Quarterly Journal of Economics 112(4): 1203-1250.

Easterly, W. and R. Levine (2001) 'It's Not Factor Accumulation: Stylized Facts and Growth Models', World Bank Working Paper (March).

Easterly, W., M. Kremer, L. Pritchett and L. Summers (1993) 'Good Policy or Good Luck – Country Growth Performance and Temporary Shocks', Journal of Monetary Economics 32: 459-483.

ECLAC (1999) Social Panorama of Latin America, 1998. Santiago de Chile: ECLAC.

Fajnzylber, P. and D. Lederman (1998) 'Economic Reforms and Total Factor Productivity Growth in Latin America and the Caribbean, 1950-95: An Empirical Note', World Bank Working Paper (March).

Favaro, E. and P. T. Spiler (1991) 'Uruguay', in Papageorgiou, D., M. Michaely and A. M. Choksi (eds) Liberalizing Foreign Trade – Volume 1 – The Experience of Argentina, Chile and Uruguay. Cambridge: Basil Blackwell, pp: 321-406.

Filgueira, F., M. Furtado and R. Kaztman (2000) 'New Challenges for Equity in Uruguay', CEPAL Review 72: 79-97.

Heston, A., R. Summers and B. Aten (2001) Penn World Table Version 6.0. Center for International Comparisons at the University of Pennsylvania (CICUP), December 2001.

Instituto de Economía (1971) El Proceso Económico del Uruguay [The Uruguayan Economic Process]. Montevideo: Fundación de Cultura Universitaria. Segunda edición.

Islam, N. (1995) 'Growth Empirics: A Panel Data Approach', Quarterly Journal of Economics 110(4): 1127-1170.

Kaufmann, D., A. Kraay and P. Zoido-Lobatón (1999a) 'Aggregating Governance Indicators', World Bank Policy Research Working Paper 2195.

Kaufmann, D., A. Kraay and P. Zoido-Lobatón (1999b) 'Governance Matters', World Bank Policy Research Working Paper 2196.

Keefer, P. and S. Knack (2001) 'Polarization, Politics and Property Rights. Links between Inequality and Growth', World Bank Working paper (December).

Koopmans, T. (1965) 'On the Concept of Optimal Economic Growth' in The Econometric Approach to Development Planning. Amsterdam: North Holland.

Lucas, R. (1988) 'On the Mechanics of Economic Development', Journal of Monetary Economics 22 (July): 3-42.

Mankiw, N.G., D. Romer and D.N. Weil (1992) 'A Contribution to the Empirics of Economic Growth', Quarterly Journal of Economics 107(2): 407-438.

Nelson, R. and H. Pack (1997) 'The Asian Miracle and Modern Growth Theory', World Bank Working Paper (October).

Niedergang, M. (1962) Les Vingt Amériques Latines [The Twenty Latin Americas]. Paris: Librairie Plon.

Olesker, D. (2001) Crecimiento y Exclusión [Exclusion and Growth]. Montevideo: Ediciones Trilce.

Pack, H. (1994) 'Endogenous Growth Theory: Intellectual Appeal and Empirical Shortcomings', Journal of Economic Perspectives 8(1): 55-72.

Quah, D. (1996) 'Twin Peaks: Growth and Convergence in Models of Distribution Dynamics', The Economic Journal 106: 1045-1055.

Ram, R. (1986) 'Government Size and Economic Growth: A New Framework and Some Evidence from Cross-Section and Time-Series Data', The American Economic Review 76(1): 191-203.

Rama, M. (1991) 'El País de los Vivos: un Enfoque Económico' [The Country of the "Clever-People": an Economic Approach]. CINVE, Suma 6: 7-36.

Ritzen, J., W. Easterly and M. Woolcock (1999) 'On "Good" Politicians and "Bad" Policies: Social Cohesion, Institutions, and Growth', World Bank Working Paper.

Romer, P. (1986) 'Increasing Returns and Long-Run Growth', Journal of Political Economy 94(5): 1002-1037.

Sala-i-Martin, X. (1996) 'The Classical Approach to Convergence Analysis', Economic Journal 106: 1019-1036.

Schumpeter, J.A. (1912) [1983] Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle. New Jersey: Transaction Pub.

Smith, A. (1776) [1981] An Inquiry into the Nature and Causes of the Wealth of Nations. Indianapolis: Liberty Press.

Solow, R.M. (1956) 'A Contribution to the Theory of Economic Growth', Quarterly Journal of Economics 70: 65-94.

Solow, R.M. (1999) 'Neoclassical Growth Theory', in Taylor, J.B. and M. Woodford (eds) Handbook of Macroeconomics Volume 1A. Amsterdam: North Holland, pp: 637-667.

Spektorowski, A. (2000) 'Nationalism and Democratic Construction: The Origins of Argentina and Uruguay's political cultures in comparative perspective', Bulletin of Latin American Research 19: 81-99.

Summers, R. and A. Heston (1991) 'The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950-1988', Quarterly Journal of Economics 106(2): 327-368.

Temple, J. and P.A. Johnson (1998) 'Social Capability and Economic Growth', Quarterly Journal of Economics 113 (3): 965-990.

Thorp, R. (1998) Progress, Poverty and Exclusion – An Economic History of Latin America in the 20th Century. Washington: Inter-American Development Bank.

United Nations Development Programme (2001) Human Development Report – Making New Technologies Work for Human Development. New York: Oxford University Press.

World Bank (1993) The East Asian Miracle. Oxford: Oxford University Press.

World Bank (2001) World Bank Development Indicators 2001. Washington: World Bank.

ACRONYMS

CIDE	Comisión de Inversiones y Desarrollo Económico Commission of Investments and Economic Development
CINVE	Centro de Investigaciones Económicas Centre of Research in Economics
ECLAC	Economic Commission for Latin America and the Caribbean
GDP	Gross Domestic Product
LDCs	Less Developed Countries
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
R&D	Research and Development
UNDP	United Nations Development Programme