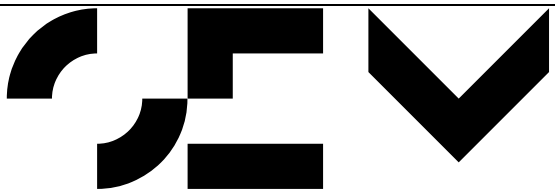

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# Convergence Patterns in Latin America

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# Convergence Patterns in Latin America

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**Abstract**

Literature on convergence among Latin American countries is still scarce compared to other regions. Moreover, almost none of the research connects convergence to the economic history of Latin America and the usual finding is one speed of convergence. In this paper I analyze 32 countries and 108 years, more observations than any other study. This long span of data allows me to use economic history to explain, analyze, validate, and understand the results of convergence patterns in the region. I find more than one speed of convergence (clubs) related to the known historical background, country characteristics, and external shocks in the region. I study three important phases, following Thorp (1998): from1900 to 1930, the exporting phase, from 1931 to 1974, the industrialization phase, and from 1975 to 2007, the globalization phase. During the last two phases, I find strong evidence of convergence among those countries that succeeded in industrializing and/or building good institutions. The reason is that technology diffusion and capital accumulation is easier when these 2 phenomena occur.

**Keywords**: Latin America, economic history, convergence, growth.

**JEL codes**: N0, N16, O0, O40, O47

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# Introduction

Although economic convergence is not a recent topic, it is crucial in economics and it is still ongoing (Sala-i-Martin, 2006; Welsh and Bonn, 2008; Hall and Ludwing, 2006). It is important for development economists to find out if developing countries are catching up to developed countries or not and if the differences in income across countries tend to decrease or increase. The detection of income disparities between economies can help finding out how to speed up the process of economic development.

For the case of Latin America, one could expect some sort of convergence since they have few language barriers, similar culture, religion, and common history[1]. However, preliminary analysis of the income distribution, measured as the dispersion of the GDP per capita, shows that the dispersion among Latin American countries has become highly unequal over time, contrary to the OECD countries (See Figure 1). Nevertheless, when income dispersion is graphed only for the eight Latin American countries (LA8)that have complete data from 1900 (Argentina, Brazil, Chile, Colombia, Mexico, Uruguay and Venezuela), the pattern of dispersion is reversed, they actually converge . All this suggests that there are different patterns of convergence in Latin America, and, certainly, Latin American countries are not as similar as expected.

Previous literature on Latin America is still scarce compared to other groups of countries and their results are quite diverse[2]. Research tends to center on convergence among regions within a given country rather than across countries[3]. Almost none of the research relates convergence to the economic history of Latin America[4]. Usually one single parameter of speed of convergence is found for a limited number of years and countries. In this paper I analyze 32 countries and 108 years, more observations than any other study[5].

It is hard to go through more than 100 years without paying attention to the economic history of Latin America. Countries in the region have followed different patterns concerning development efforts and exposure to external shocks. This study uses known economic history facts to divide countries with similar characteristics into groups, clubs, such that convergence is expected and consequently tested. Based on Thorp (1998), I identify three important phases, 1900-1930, 1931-1974, and 1975-2007[6], and two to three groups within each phase.

The first phase ranges from 1900 until 1930 - when the Great Depression whipped the Latin American economies - and it is characterized by the Latin American countries intensively exporting primary products. Two groups are identified: the mineral and agricultural products exporters. This phase is called *exporting phase.*

During the second phase, an inward-looking model was the response to the Great Depression. This model is

[1] In theory, countries with identical structural characteristics, such as preferences and technologies, are expected to converge (Barro and Sala-i-Martin, 2004).

[2] There are nine studies specialized on the region (discussed in detail further below).

[3] Studies within a given country are concentrated in few countries, such as Argentina, Brazil, Chile, Colombia, and Peru.

[4] The reason for the lack of studies is the poor availability of data at the beginning of the century. Astorga et.al.(2005) is the only other study where economic history events are introduced.

[5] Astorga et.al.(2005) analyzed the longest period: 100 years but only six countries while Dobson, Goddard and Ramlogan (2003) analyzed 24 countries but only 30 years.

[6] In fact, the division of periods and groups differs slightly from Thorp (1998). These differences are discussed further below.

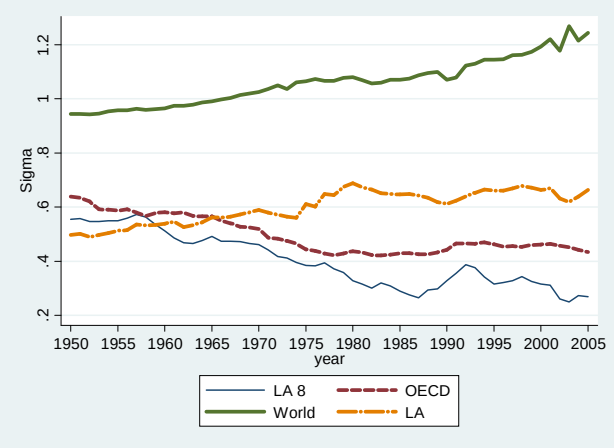


Figure 1: **GDP per capita dispersion in the World, OECD, Latin America and eight Latin American countries (LA8).** Standard deviation of the logarithm of GDP per capita.

known as Import Substitution Industrialization (henceforth simply *industrialization phase*) and goes from 1931 to 1974 when the oil crisis occurred[7]. Two groups are identified: those that were able to industrialize, despite all the distortions that the model brought, and the non-industrializers which failed to industrialize for different reasons.

The third phase ranges from 1975 to 2007. This phase is characterized by several features. First, Latin America experienced the debt crises in the early 80s, to which it responded with several "structural reforms". Then, from these reforms and from an accumulation of several factors during history, the need for a change in development to one with a more social outlook in a globalization context arose. I call this phase *The globalization phase.* Three groups are identified during this phase: good institutions countries, which developed institutions that could deal with growth and/or welfare, painful processes countries, which were traumatized by the debt crises adjustment, and vulnerable countries, the Caribbean which are different from the rest and are characterized by being vulnerable to external factors.

In this paper I use the solid theoretical framework of Barro and Sala-i-Martin (2004), a neoclassical growth model which is the most common in the literature and reaches concrete results on the speeds of convergence, and is also used to analyze club convergence. I use single cross section and panel data regressions to estimate the speed of convergence for each period and group. In this way, by grouping countries with similar characteristic, I avoid using arbitrary determinants of growth. At the same time, I solve the problem of lack of data for explanatory variables at the beginning of the century, and I expand the usual range of data analyzed so far. I use data from Madisson (2003) combined with the World Bank (2009), which allows me to have a data set for more than a century.

[7]Thorp (1998) defined the period: 1945-1973 and called it "Industrialization and the growing role of the State", since the state took a greater role in the industrialization process. However, the industrialization process was triggered before, from when the Great depression hit the world economy (1930). I discuss this later.

I find that there has been more than one speed of convergence in the last 108 years, and that this is related to the historical background, country characteristics, and external shocks in the region. I find that during the phase of industrialization, 1931-1974, and globalization, 1975-2007, there is strong evidence of convergence among those countries that succeed in industrializing and/or building good institutions. The reason is that technology diffusion is easier when these phenomena occur, allowing countries that were behind in the beginning to accumulate capital and catch up.

I also test for convergence in the most advanced integration processes and geographical regions in Latin America. Here, convergence failed. The reason is that the integration processes are not yet developed to be able to reach convergence in terms of output per capita and the geographical location is not an issue for convergence.

This paper is laid out as follows. In the first section, I present a summary of convergence theory and a review of previous research on Latin America. Section 2 describes the data. Section 3 presents the most important facts of the economic history of the region and describes the country groups where convergence is expected. Section 4 displays the methodology implemented to analyze convergence and section 5 discusses the results and different issues that may call the validity of the results into question. Finally, the conclusions are presented.

# 1 Theory and Prior Research

Economic convergence exists when two or more economies tend to reach similar levels of development and wealth. Literature on convergence defines four concepts: absolute-$\beta$ or catching-up, conditional-$\beta$, club, and sigma convergence. Absolute-$\beta$ or catching-up convergence exists when a number of economies converge to one another in the long run, independently of their initial conditions. Conditional-$\beta$ convergence exists when per capita incomes of economies that have identical structural characteristics, i.e. preferences, technologies, rates of population growth etc., converge to one another in the long run independently of their initial conditions. Club convergence is conditional $\beta$ convergence conditioned on having similar initial conditions. Finally, $\sigma$-convergence across a group of economies exists if the dispersion of their real per capita GDP tends to decrease over time[8]. $\beta$-convergence measures the mobility of income within the same distribution. On the other hand $\sigma$-convergence studies how the distribution of income varies over time. $\beta$ -convergence is a necessary but not sufficient condition for $\sigma$-convergence[9].

Once economic convergence is found, the reasons could be diverse. One of the theoretical reasons is diminishing returns to capital such that an economy with a lower level of capital than a rich economy will grow faster and will catch up when it starts accumulating capital. The other reason is technology diffusion, that is the existence of lower costs of technology imitation than technology innovation such that "followers" imitate the products invented by "leaders" and end up catching up (Nelson and Phelps (1966), and Barro and Sala-i-Martin

[8] For an extensive discussion of concepts see Galor (1996).

[9] See (Barro and Sala-i-Martin, 2004) for a discussion between the two concepts and the formal derivation of their relation.

(2004)). In practice, convergence could also be due to a result of an intended process as in the case of integration agreements where rich regions help the poor ones to catch up (Navarro and Sotelsek, 2001).

A large number of studies have focused on convergence among regions within a given country rather than cross country studies. The research is focused on industrialized countries rather than developing countries (De la Fuente, 2002; Holmes, 2005; Dobson and Ramoglan, 2002a and 2002b). Among the world wide studies, a typical finding is a speed of convergence of about 2% per year and sometimes higher when panel data is used (De la Fuente, 2002; Sala-i-Martin, 2004; Islam, 1995). The 2% speed implies that every 35 years a country will be half way closer to its steady-state.

In Latin America, previous research on the topic has been scarce compared to other regions (Dobson et al, 2003; De la Fuente, 2002). There are only nine cross-country studies specialized in the region. Even though they analyze the same region, they study different countries, periods, and apply different methodologies, making it hard to compare results.

Some of the authors used methodologies that do not measure a specific speed of convergence but still analyzed the pattern of convergence. Blyde (2006) studies 21 countries during 1960-2004. He uses a distribution dynamics approach and find that countries are converging into two groups; one large for low and low middle income countries and another small for rich income countries[10]. In a similar fashion Blyde (2005) finds that the dispersion across countries in the integration process MERCOSUR has increased. Holmes (2005) analyzes 16 countries during 1960-2000 and uses principal components and cointegration analysis. The author studies convergence among all countries and also groups them into two integration unions. He finds weak convergence in ALADI (12 countries) and strong convergence in MCCA. Dobson, Goddard and Ramoglan (2003) study the case of Latin America among other regions of developing countries. They study the case of 24 Latin American countries during 1965-1998 by cross section analysis and unit root with panel data tests. The authors find convergence only for the whole sample under their panel data tests. The problem with these methodologies is that they cannot give an idea of the level of speed of convergence.

On the other hand, other researchers find concrete results on the speed of convergence. Astorga, et.al (2005) study six countries (Argentina, Brazil, Chile, Colombia, Mexico, and Venezuela) during the period of 1900-2000. They find convergence using panel data and error correction models, at a speed between 1% and 1.9%, where the oscillation comes from the addition or subtraction of explicative variables that proxy for the steady state. They include human capital, external, institutional, and economic variables, together with dummies for the Crisis of 1929, the Great Depression of 1930, and the debt crises of 1980. Dobson and Ramlogan (2002a and b) study 19 countries and 28 and 30 years respectively (1970-1998 and 1960-1990) using cross section regression and panel data analysis. They find speeds of convergence of 0.02% to 2% . Their studies include, as proxies for the steady state, sectorial decomposition variables, country dummies, population growth, savings, and human

[10]The rich income countries are Uruguay, Argentina, Chile, and Mexico, and the remaining 17 countries were in the other group.

capital. Convergence is found mostly during the 70s and beginning of the 80s. Helliwell (1992) analyzes 18 Latin American countries for the period 1960 - 1985 and finds convergence at a speed of 2.5%. He includes variables as investments, population growth, human capital, and scale effects. Utrera (1999) analyzes convergence among 20 countries and 42 years (1950-1992) and finds convergence, through cross section regressions, at speeds of around 0.2% to 3.8 %. The author uses as control variables investments, human capital, public expenditure, sectorial composition, life expectancy and child mortality. Dabus and Zinni (2005) analyze 23 countries and 38 years (1960-1998) and find absolute and very high conditional convergence. The authors argue that once controls are introduced and extremely high speeds of conditional convergence are found, compared to absolute convergence, then it is a signal of divergence. This is a good point since when controlling by many characteristics, a hypothetical speed of convergence is being calculated while the real speed of convergence would be absolute convergence. They conclude that convergence of any type is absent in Latin America. Finally, Madariaga et.al.(2003) analyze convergence among four countries, part of an integration process, MERCOSUR, for 15 years (1985-2000). They test the link between economic integration, density of activities, and convergence. As density of activities they used agglomeration variables as GINI, distance to the capital, and frontier information. They find both absolute and conditional convergence at very high speeds, which are hard to compare to the results of other studies.

The number of studies of convergence within Latin American countries is greater than the number of cross country studies in the region. Studies on convergence within a given country are usually concentrated in few countries. Typically, the speeds of convergence found are around 2% as in Elías and Fuentes (2001), where they analyze 34 regions in Argentina and Chile, and in Marina (2001) for the Argentinean case only. Azzoni et al.(2001) find a speed of less than 1% for Brazil, and, higher rates are found by Anriquez and Fuentes (2001) for the Chilean case and by Cardenas and Ponton (1995) for the Colombian (around 4% in both cases). See also Utrera and Koroch (1998), Magalhaes, Hewings and Azzoni (2005), Azzoni (1996), Serra et al.(2006), Cardenas and Poton (1995).

Summing up, the existing literature on convergence among Latin American countries is scarce, it is centered on a given country rather than cross-country cases, and it is hard to compare to this paper. Previous studies analyzed either short periods or a small number of countries. The control variables introduced to approximate the steady-state vary greatly. Durlauf and Quah (1999) mention that the choice of the steady-state proxies depends on the interest of the researcher and that can lead to wrong results. In addition, too many controls say less about what real convergence means. Almost none of the studies relates economic history to convergence. One reason could be the lack of data in the region, especially at the beginning of the century. Most of the papers start their analysis from around 1960, when more detailed data appears. Another reason could be that previous studies did not have the need to introduce economic history because they grouped few countries as part of a club with a specific characteristic, like being part of an integration process or having a specific level of income.

In this paper I have a long span of data which allows me to exploit the link with economic history, which in turn is very useful to explain, analyze, validate, and understand the results of convergence.

## 2 Data

The analysis covers 32 countries, listed in Table 1, for the period 1900-2007. The potential number of observations is 3,456 but due to incomplete data for some countries, the number of real observations is reduced to 2,209. This is the largest data set used in the literature on convergence in Latin America. The second largest would be from Astorga et.al. (2005) with 606 observations, 6 countries and 100 years.

| Country | Observations | Missing observations | Starting year | Ending year |
|---|---|---|---|---|
| Argentina | 108 | 0 | 1900 | 2007 |
| The Bahamas | 28 | 80 | 1975 | 2002 |
| Belize | 33 | 75 | 1975 | 2007 |
| Bolivia | 63 | 45 | 1945 | 2007 |
| Brazil | 108 | 0 | 1900 | 2007 |
| Barbados | 25 | 83 | 1975 | 1999 |
| Chile | 108 | 0 | 1900 | 2007 |
| Colombia | 108 | 0 | 1900 | 2007 |
| Costa Rica | 88 | 20 | 1920 | 2007 |
| Cuba | 76 | 32 | 1929 | 2004 |
| Dominica | 31 | 77 | 1977 | 2007 |
| Dominican Republic | 58 | 50 | 1950 | 2007 |
| Ecuador | 69 | 39 | 1939 | 2007 |
| Grenada | 28 | 80 | 1980 | 2007 |
| Guatemala | 88 | 20 | 1920 | 2007 |
| Guyana | 33 | 75 | 1975 | 2007 |
| Honduras | 88 | 20 | 1920 | 2007 |
| Haiti | 63 | 45 | 1945 | 2007 |
| Jamaica | 64 | 44 | 1913 | 2007 |
| St. Kitts and Nevis | 31 | 77 | 1977 | 2007 |
| St. Lucia | 28 | 80 | 1980 | 2007 |
| Mexico | 108 | 0 | 1900 | 2007 |
| Nicaragua | 88 | 20 | 1920 | 2007 |
| Panama | 63 | 45 | 1945 | 2007 |
| Peru | 108 | 0 | 1900 | 2007 |
| Puerto Rico | 52 | 56 | 1950 | 2001 |
| Paraguay | 69 | 39 | 1939 | 2007 |
| El Salvador | 88 | 20 | 1920 | 2007 |
| Trinidad and Tobago | 58 | 50 | 1950 | 2007 |
| Uruguay | 108 | 0 | 1900 | 2007 |
| St. Vincent and the Grenadines | 33 | 75 | 1975 | 2007 |
| Venezuela | 108 | 0 | 1900 | 2007 |
| Total | 2,209 | 1,247 | | |

Table 1: **Description of the data set**

The main variable is the GDP per capita measured in constant 1990 International (Geary-Khamis) dollars. This measure allows for comparison of standards of living of the countries; it takes into account the purchasing power parity of currencies and the international prices of commodities. The source of information is mainly the historical Madison Data Base (Maddison, 2003), updated with the World Bank Data Base (World Bank, 2009).

The final data base has the Madison data from 1900 until 1989, and then from 1990 to 2007 the transformed World Bank data. The World Bank data is transformed by a converter factor (C) which is calculated as the ratio of the GDP from the Madison data base (M) to the GDP of the World Bank data base (W): $C_{(1990)} = M_{(1990)}/W_{(1990)}$. The factor is calculated for each year and was kept constant from 1995. There are some cases where the treatment is slightly different. In the case of ten small Caribbean countries, Madison has no data at all so the converter factor is taken constant, for the year 1995, from another country that heavily influenced these economies and is assumed to have a similar converter factor. The converter factor from USA is used for The Bahamas; from Great Britain for Barbados and Belize; from Haiti for Dominica St.Kitts and Nevis, St. Lucia, St.Vincent and the Grenadines; from Colombia for Guyana, and finally from The Dominican Republic for Grenada. The converter is multiplied by the World Bank data, which in most cases is available from 1975 to 2007. In the case of Cuba, the available World Bank GDP data was measured in constant 2000 local currency. Here, the converter factor was calculated with that kind of data and kept constant for the year 2001. The transformed data go from 2001 to 2007.

Tables 4 through 6 in the appendix show a description of the GDP per capita[11] by country and period. The last phase has the highest average GDP per capita. However, when restricting attention to the countries that appear in all phases it turns out that the first phase is the richest and it is also the least volatile.

# 3 Historical background

Studying the development of Latin America for 108 years cannot avoid the study of its history. Besides the three phase division, I divide the data into groups of countries, where data is available, with similar characteristics such that convergence is expected. I merge some groups from Thorp (1998) in order to have at most three groups in each period. The idea is that each group's main characteristic match each period's description and that groups differ from each other in a clear way. This section describes the groups and discuss the most important facts occurred in Latin America.

## 3.1 The Exporting phase (1900-1930)

The first phase ranges from 1900 until 1930 - the year when the Great Depression whipped Latin American economies - and it is characterized by countries intensively exporting primary products. In this period, countries

[11] In order to avoid irregular values, I use two year annual averages of the GDP per capita. GDP growth, is calculated as the geometric annualized average growth of each period.

were vulnerable to world income and to fluctuations in primary products prices. I identify two groups in this phase: those that exported agricultural products and those that exported mineral products[12]. Agricultural production was vulnerable to natural disasters and minerals to recessions in the industrialized countries, since minerals were used in construction, machinery, and chemicals production. The mining sector was characterized by using less land and less labor. It required more capital and technological intensity and had different transport needs than the agricultural sector.

### 3.1.1 The Agricultural Group

The agricultural group is composed by ten countries: Argentina, Brazil, Colombia, Costa Rica, Cuba, El Salvador, Guatemala, Honduras, Nicaragua, and Uruguay. Due to the lack of availability of data I cannot include more countries even though this group is originally larger. Still, the available countries are the most relevant because having old data indicates higher economic strength and importance of those countries in the region.

The agricultural countries were mainly producing coffee, bananas, cocoa, sugar meat and/or wheat. Those mainly producing coffee were Brazil, Colombia, El Salvador and Nicaragua. For Costa Rica and Guatemala, the main exports were coffee and bananas, while for Honduras it was bananas and precious metals. In general, Central American countries experienced higher production of bananas after the American multinational company, United Fruit, came to the region (in the 1920s). Cuba produced mainly sugar but also tobacco. Argentina and Uruguay were mainly producing meat and wheat. Argentina was the richest and Uruguay was the second richest on average during the whole period[13] (see Table 4). Argentina had a lot of infrastructure (railways and ports) and was one of the countries with most trade affluence. Uruguay experienced the benefits of being close to Argentina.

### 3.1.2 The Mineral Group

The mineral countries number four: Chile, Mexico, Peru and Venezuela. They exported mainly petroleum and copper. Petroleum was produced by all except Chile, and copper was produced by all except Venezuela. Before 1917, Venezuela was mainly producing coffee and cacao, but after that year petroleum became the most important source of revenue. Mexico was the most diversified export country in Latin America. They also exported lead, zinc, silver, gold, coffee, rubber, and cotton. They discovered oil in 1910. Chile and Mexico were the richest after Argentina and Uruguay.

The mineral countries were more volatile than the agricultural. For instance, Venezuela had the lowest GDP per capita of the mineral countries in 1907 (793 International $), and the highest in 1929: 3,426 $

[12] Thorp (1998) organized countries according to their main export product. I merged them in these 2 groups.

[13] Argentina and Uruguay were characterized by receiving more immigrants that established in their countries compared to the others.

## 3.2 The Industrialization Phase (1931-1974)

Thorp (1998) defines the period from 1945 to 1973 and calls it "Industrialization and the growing role of the State". However, the industrialization process was triggered before, when the Great depression hit the world economy. Therefore I expand this phase from 1931, and instead of 1973 as ending year I take 1974, when the oil crises occurred.

The Great Depression provoked a fall in economic activity in the industrialized countries, which in turn reduced their demand for primary products and reversed the capital inflows to Latin America. This situation deteriorated the terms of trade of all primary products, leading to an increase of the Latin American real import prices. The natural mechanism would suggest a decrease in real export prices which should have stimulated the demand again, but due to the extreme circumstances of the Great Depression, the world demand could not recover. Instead, Latin American demand shifted from imported manufactured goods to domestic manufactured products, because the former were expensive. This process stimulated the import substitution phase of Latin America. Therefore, the Great Depression pushed many Latin American countries into a process of import substitution strategy by default (Cardoso and Helwege, 1992).

The process of industrialization via import substitution was reinforced by the second World War (1939-1945). Although WWII brought an increase of Latin American exports, there were constraints on their imports. Consequently, the scarcity of imports and the deterioration of the terms of trade of primary products encouraged new efforts to substitute imports, but these efforts were limited in turn by scarcity of imported inputs and capital goods. Additionally, the consensus on the importance of industrialization via import substitution found theoretical and institutional support in the United Nations Economic Commission for Latin America (ECLA).

The inward looking model consisted of substituting imports, and since imports were characterized by being highly industrialized, Latin America went into a process of industrialization. Therefore, two groups emerged in this period: the industrializers and the non-industrializers[14]. The industrializers succeeded in creating capital goods and intermediate input industries, while the non-industrializers remained as primary exporters or created inefficient industrial sectors that were not able to succeed.

### 3.2.1 The Industrilizers Group

The industrializers are six countries: Argentina, Brazil, Chile, Colombia, Mexico and Uruguay. Only these few countries succeeded in getting capital goods and creating intermediate input industries, but they still had some problems. Due to their larger domestic markets, Brazil and Mexico managed better than the other countries in the region. Both successfully created automobile industries. In fact, Brazil experienced the highest growth rates

[14]Thorp (1998) had four groups: "strong industrializers", "centrally planned" (Cuba), "primary product export models" and "export promotion and industralizing by invitation". Thorp mentions that the last two groups should be one group because both tried to industrialize but failed. The difference between them is that the first one had the government to promote the proccess of industrialization while the second invited foereign capital to do it. Therefore I merge these two groups together with Cuba into the group of countries that were not able to industrialize.

and went through a process of high and persistent growth rates, during the 60s and 70s, known as the "Brazilian Miracle".

Efficient steel production was established in Argentina and Brazil. Chile had political and social structure problems but still promoted the production (and export) of forestry, fishing, mining, and engineering sectors. Colombia industrialized its coffee and was the only country without an overvaluation, inflation, or high levels of debt, but problems of violence during the 40s and 50s affected the industrialization process. Finally, Uruguay was already industrialized by 1945 but in mid-1950 they underwent stagnation.

### 3.2.2 The Non-Industrializers Group

The non-industrializers are the countries that failed to industrialize. In total there are 17 countries: Ecuador, El Salvador, Guatemala, Nicaragua, Peru, Venezuela, Paraguay, Bolivia, Costa Rica, Honduras, Dominican Republic, Haiti, Panama, Jamaica, Puerto Rico, Trinidad and Tobago, and Cuba.

The reasons for these countries not to industrialize were diverse. Some stayed as primary exporters because of their strong dominating primary export sector, which in the majority of the cases was overprotected by the government, or because the government created inefficient industrial sectors that were not able to succeed. Others were based on different models, like Cuba and the Caribbean countries.

The primary exporters are eight: Ecuador, El Salvador, Guatemala, Nicaragua, Peru, Venezuela, Paraguay, and Bolivia. These countries were characterized by having a strong primary export sector that dominated any attempts to industrialize. Moreover, Venezuela, Peru, Bolivia, Ecuador and Paraguay were not well prepared for industrialization. Bolivia and Paraguay were the worst cases in terms of results. Bolivia's strong and powerful tin sector took advantage of a weak state to concentrate resources[15]. After the revolution in 1952 the tin sector was nationalized and the government had immense difficulties managing it. In the 60s some investments went to the mining and petroleum sectors. Paraguay was dominated by a few families, protected by the military regime of Stroessner, that were producing the traditional goods (meat and tobacco), making it hard to change economic structures. Venezuela attempted to industrialize late, and the result was the creation of an inefficient industrial sector with strong rent seeking characteristics, which brought a lot of distortions. The Venezuelan economy was highly dependent on its oil, with characteristics of Dutch Disease. Ecuador's protectionism carried out in the 60s only benefited the traditional elite groups and failed to industrialize the economy. Peru had good export prospects, so industrialization through import substitution was low.

El Salvador, Guatemala, and Nicaragua concentrated their efforts in the cotton sector, which required moving peasants from their own lands, making them worse off (Williams, 1986). All three countries had very low levels of GDP per capita, especially El Salvador and Honduras. In fact, El Salvador had the lowest GDP per capita of all Latin American countries (See Table 6).

[15] A lot of the debt was directed to pay expensive railroads for the sector.

Based on a model of central planning, Cuba tried to diversify their sugar-concentrated economy to corn, rice, cotton, tomatoes, and soybeans, but the lack of skilled labor and shortages of materials pushed them back to the production of sugar.

The Caribbean countries were under a program of export promotion and industrializing by invitation. Headed by Puerto Rico, the Caribbeans tried to search for different markets than sugar. They gave concessions to foreign firms, so they could invest and industrialize, but employment did not increase, and by the 60s foreign firms left.

### 3.3 The Globalization phase (1975-20047)

The third phase ranges from 1975 to 2007. Due to the oil shock of 1974, Latin American accumulated debt and did not prevent the coming debt crises, which started in 1979 and 1981, when USA and other OECD countries kept their money supply tight and increased interest rates radically. The mechanism is described by Cardoso and Helwege (1992) as follows: "..Oil exporters deposited their earnings in the commercial banks of developed countries, but higher oil prices caused a recession in OECD countries and reduced the demand for credit. Left with excessive liquidity bankers eagerly lent to the Third World at very low interest rates.." Since countries acquired loans at floating interest rates, their debt obligations increased vastly. The adjustment left problems that reinforced each other, like capital outflows, fiscal deficits, inflation, overvaluation, and balance of payment crises.

Countries wanted to stabilize and gain access to foreign credit again, so they applied "structural reforms" to reach stabilization. These reforms were based on fiscal orthodoxy, liberalization, and reducing the role of the state. The IMF suggested to cut budget deficits by reducing expenses and increasing taxes, privatize, liberalize imports and exchange controls (devaluate), eliminate price controls, and increase interest rates. Although countries sooner or later followed the structural reforms, the results were not as good as expected. The export sectors of several countries failed to react positively to the exchange rate depreciation. Higher prices of imported goods reinforced inflation and consequently overvaluation. With higher interest rates it was hard to promote investments, and due to the tendency of overvaluation and weak export sectors was not possible to promote exports either. Furthermore, governments had to close factories, resulting in high rates of unemployment and large informal sectors.

Regarding welfare results, income distributions worsened in all countries outside of the Caribbean, except in Uruguay and Costa Rica. Poverty, which worsened during the 80s, hardly improved during the 90s. This situation encouraged rethinking the link between growth and equality. Different trends of thought arose around the mid 80s; some supported the idea that good institutions create complementaries between productivity growth and equality, others that policies that are linked to the political constituency will create a combination of economic and social development (Thorp, 1998).

Following Thorp's line I divide countries during the third phase in three groups: those that were able to

provide the link between growth and welfare in a globalization context, the "good institutions" group, the ones that suffered serious consequences of the debt crises, the "painful" group, and the Caribbean countries which are different from the other groups and are vulnerable to external factors, the "vulnerable" group[16].

### 3.3.1 The Good Institution Group

The group of good institutions is composed by seven countries: Chile, Argentina, Uruguay, Mexico, Colombia, Costa Rica and Brazil. Although some of the countries in this group have had weakened institutions, such as Argentina, they have managed to reach either acceptable growth rates, good welfare standards, or both.

On the one hand, Chile, Argentina, Uruguay, and Mexico were able to link economics with welfare in a creative and effective way thanks to the prior conditions they met. Although Chile has a high degree of inequality and poverty, they managed to build strong institutions, and good relations among the public and private sector. The state promoted exports and investments. Even though they have applied radical orthodox policies and hosted radical violent military regimes, they have built a political consensus afterwards. They truly committed to the rules of the free market game, gaining investors confidence. Moreover Chile has developed a process of consultation to identify poorly designed policies.

Argentina and Uruguay had a similar experience to Chile. Both underwent military regimes but Argentina did not learn from this experience as Chile did, while Uruguay built its political consensus from it. Argentina had a lot of political problems and adopted both orthodox and heterodox policies (as Mexico). In the 90s it implemented the "convertibility plan", the purpose of which was to establish strict discipline on the monetary and fiscal policy. The plan was the keystone for entry into the international system. This attracted investments, and together with the privatization, the quality of public services improved. Nevertheless, in 2001 Argentina went into a crisis. The weak fiscal policy and high fiscal deficits from the provincial governments were reflected in an increasing public debt burden, and the growing overvaluation led to a debt crisis.

Furthermore, Uruguay and Argentina were part of the trade union MERCOSUR , which helped them promote dynamic firms. Uruguay was the only country to improve welfare indicators during this period and was known by the democratic process of using popular consultation to approve policies. Mexico could provide the link between economics and welfare, particularly because of its strong international orientation. Mexico became part of the NAFTA-North American Free Trade Agreement, which involves USA and Canada.

On the other hand, Brazil, Colombia, and Costa Rica progressed because they had been coherent with their earlier policies. Colombia, for example, managed to build very strong and qualified institutions that managed the economic issues very well. They did not borrow too much and they did not have hyperinflation. In fact, Thorp (1998) points out that Colombia is the only country where liberalization coincides with a growing state, reflected

[16]Thorp (1998) had five groups that she called: "using the paradigm shift", "reluctant converters", "other radical stabilizers", "pain without gain", "the Caribbean: greatest vulnerability". I merged the first two groups into the good institutions group. The next two were merged into the painful group and the last was kept as the vulnerable group. More details are in the description of each group.

in the rapid growth of social spending. Nevertheless, corruption and drugs were serious social problems. Costa Rica is characterized by their democratic values, good relations with the private sector, and high standards of education. Finally, Brazil, due to its size, was allowed to integrate to the global market in its own way and its own speed, as everybody wants to have access to Brazil´s big market.

### 3.3.2 The Painful Group

The painful group is composed of nine countries: Peru, Bolivia, Ecuador, Paraguay, Venezuela, Nicaragua, El Salvador, Guatemala, and Honduras. This groups is characterized by having weak institutions that lead to bad results either in terms of growth, welfare, or both.

Bolivia and Peru did not meet the prior conditions that link growth with welfare. They applied orthodox policies and their structural problems exposed them dramatically to the perils of globalization. Peru had institutional weakness, lack of experience, and lack of democracy to sustain the reforms. Bolivia spent a lot of time to recover from their hyperinflation, which was a hard process. Moreover, their levels of poverty are still very high.

Ecuador, Paraguay, Venezuela, Nicaragua, El Salvador, Guatemala and Honduras lacked good institutions, had social conflicts with guerrilla forces (Guatemala and El Salvador), and problems of contraband (Paraguay). As an oil country, Venezuela mismanaged several oil booms, provoking a banking crisis in 1991. Although they liberalized, there was a lack of political support and proper communication of the reforms, resulting in social resistance. Venezuela, Ecuador, and Paraguay faced strong opposition in abolishing all protection. After 34 years of a military regime, until 1989, Paraguay could not build an efficient system of government.

The central American economies were severely affected by the debt crises (except Costa Rica), because they had a lot of oppression, corrupted military, and civilian regimes. They tried to undertake market reforms, but due to political fragility they could not succeed. Moreover, poverty and exclusion are a common denominator for these countries.

### 3.3.3 The Vulnerable Group

Finally, the vulnerable group includes 16 Caribbean countries: The Bahamas, Barbados, Belize, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Panama, Puerto Rico, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago.

The Caribbean countries were more severely affected by the adverse trends of the 1970s and 1980s than the rest of Latin America. While one or two countries could benefit by developing financial services (the Bahamas, for example), most acquired debt and vulnerability to capital flight and international interest rate changes. These economies are characterized by being too vulnerable to external shocks. They are quite open[17] and primary

[17] In the 1990s, 19 of the 26 Caribbean states had a ratio of Exports and Imports to GDP of over 100 percent (Thorp, 1998).

products producers. Their agricultural sector performed so poorly that they are net food importers. Although Cuba is different from the other countries, it is still extremely vulnerable to external factors. When the Soviet Union collapsed, Cuban exports were reduced dramatically. Additionally, Caribbean countries are exposed to natural disasters. Equality and human development in the Caribbean countries are characterized by very poor indicators, as the case of Haiti.

Table 7 shows the membership of each country in the different groups.

# 4 Methodology

I follow the setup of the Neoclassical growth models which are based on an economy with a specific production function and a utility function that represents its preferences. Under certain assumptions, the economy reaches an equilibrium, the steady-state, where it grows constantly. If the economy is approaching its steady-state, there is convergence, but if it is moving away from the steady-state, there is divergence. Therefore, the empirical analysis consists in estimating growth equations for a given period that relate growth to the initial state and the steady-state.

As discussed in the previous section, I form groups of countries by conditioning on similar features, such as having followed similar economic patterns and having responded similarly to external shocks. The point is that within each group it is assumed the same steady-state applies such that convergence is expected[18].

Grouping is convenient because it places less demand on the limited data on the determinants of growth. Availability of data in Latin America is poor in general, but mostly at the beginning of the 20th century. Moreover, as Sala-i-Martin (1996b) mentions, one should restrict the study of convergence to a set of economies for which the assumption of similar steady-states is realistic, which I argue is the case here.

I analyze the relation between the initial state approximated by the initial level of output and the average growth rate of a certain period. If the relation is negative, poorer countries are growing faster in average so that they are catching up. The model setup follows Barro and Sala-i-Martin (2004), which is the most commonly used in the literature. The following equation measures the relation for countries $i = 1, ...N$ during periods $t = 1, ...T$:

$$\gamma_{it} = a - \frac{(1 - e^{-\beta\tau_{it}})}{\tau_{it}} \cdot \log\left[y_{0it}\right] + u_i \tag{1}$$

where $\gamma_{it}$ is the average growth rate and $a$ is a constant for all countries and all periods (absolute convergence). If we assume that the $a$ differs for each country, $a_i$, it would include the steady-state for each country, then we test for conditional convergence. Furthermore, $y_{0it}$ is the initial output per capita (measured in logarithms and instrumented by its lag), $\beta$ is the speed of convergence if $\beta > 0$ (or divergence if $\beta < 0$) , $\tau_{it}$ is the total number of years within period $t$, and $u_{it}$ is disturbance term with mean zero, finite variance, and independent over $t$ and

[18] An altenative methodology for this case could be the pair wise approach fromPesaran, H (2006).

$i$.

Moreover $\gamma_{it}$ is calculated as:

$$\gamma_{it} = (1/\tau_{it}) \cdot \log [y_{it}/y_{0it}]$$

where $y_{it}$ is the last output per capita of period $t$ for each country.

Equation(1) is estimated, first, as a single cross section regression ($t = 1$) in order to capture long term convergence, and then, the analysis is divided into subperiods ($t > 1$), and panel data regressions are used.

Panel data allows using more information by including time variation, which may lead to more robust results. It also allows adding more variables, like the steady state, which tests conditional convergence, and time dummies, which controls for external conditions by capturing the global conditions that affect all countries for specific periods. A drawback of panel data is that convergence is tested in shorter spans of data which may capture short-term adjustments around the trend rather than long-term convergence. The length of each sub period for the panel data analysis was chosen according to the availability of data. Except for the first period, when data was scarce, I use subperiods of around 10 years. Table 2 show the number of subperiods and their lenght.

# 5 Results

As said before, Figure 1 reveals that the distribution of the World income, measured as the standard deviation of the GDP per capita, has become increasingly unequal, the income gap between rich and poor countries has increased year after year from 1950 to 2007. On the contrary, the OECD countries have converged among them. For the Latin American region, like for the World, the income dispersion has increased from low levels in 1950, even lower than the OECD, to very high levels of dispersion in 2007. Surprisingly, among the eight Latin American countries with most data, the dispersion has decreased to even lower levels than the OECD countries in 2007. Nevertheless, when taking a closer look in the region before 1950 (Figure 2), Latin America's high dispersion during the last phase is also observed at the beginning of the 20th century, during the exporting phase. Certainly there are different patterns of convergence. In this section I discuss the main results of convergence for all groups and phases.

Income dispersion of each group and phase is showed in Figure 3 . The only group that shows a clear pattern of $\sigma$ - divergence is the non-industrializers, and the only group that shows a clear pattern of $\sigma$-convergence is the industrializers. The agricultural and the mineral groups, from the first phase, show a less clear pattern but still one of convergence. The rest of the groups, from the third phase, illustrate null convergence being the good institution group the one with the lowest levels of dispersion and the vulnerable with the highest. The distribution of income is the most unequal for all Latin American countries during the last phase, showing very high and persistent levels of dispersion.

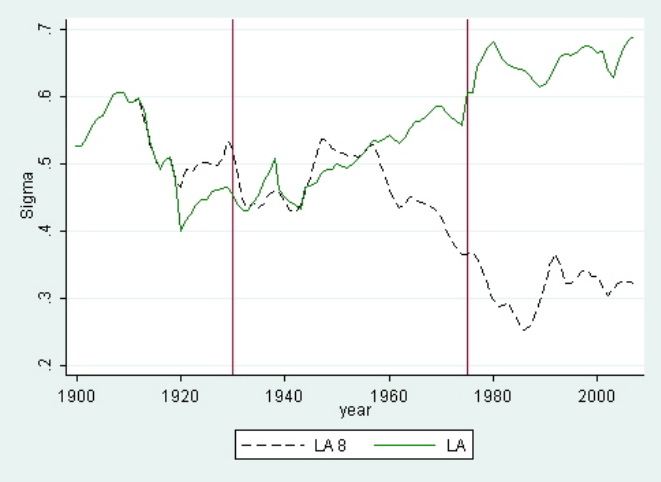


Figure 2: **GDP per capita dispersion in Latin America.** Standard deviation of the logarithm of the smoothen GDP per capita for all available countries and for the eight countries with most data (LA8). The vertical lines show each of the three phases.


Figure 3: **GDP per capita dispersion in Latin America per period and group.** Standard deviation of the logarithm of the smoothen GDP per capita for all periods and groups. The vertical lines show each of the three phases.

The results on $\beta$-convergence are validated by the replication of other studies to show that my data and techniques are good enough to expand the data set. First, I replicate the regressions of Astorga et. al. (2005), the longest period study, 1900-2000, but only for six countries. Then, I replicate the results of Dobson and Ramlogan (2002b), the study with most countries, 19, but only for 30 years, 1960-1990. The results are satisfactory (see last lines in Table 3). In Astorga et. al. (2005), their absolute convergence is 1.4%, and mine around 1%. Their conditional convergence is 1.9% and mine here 2%. In Dobson and Ramlogan (2002b), their absolute convergence is 0.5% and mine 0.3%. Their conditional convergence is 1.2% and mine 2.8% [19]. Therefore the expanded data set and techniques are consistent with the existing literature using smaller data sets.

Table 2 shows the results on speeds of $\beta$-convergence. The first column illustrates the results of absolute convergence with single cross section regression, and the rest show panel data estimations of absolute and conditional convergence with and without time effects (I don't report the coefficients for country nor time effects).

[19] My conditional convergence with time effects is the one used to compare to their highest speeds of convergence.

| Groups of countries | | | Single cross section | Panel data | | | |
|---|---|---|---|---|---|---|---|
| | | | | Absolute | | Conditional | |
| | | | t=1 | t>1 | Time Effects | t>1 | Time Effects |
| All periods | | β | **0.00%** | **0.21%** | **0.12%** | **1.11%** | **2.31%** |
| 1900-2007 | | se | 0.0041 | 0.0024 | 0.0031 | 0.0032 | 0.0035 |
| | | N | 28 | 267 | 267 | 267 | 267 |
| | | t | | | 12 | | |
| | | T | | | 18,10, 7,7,6,7,7,9,7,7,8,10 | | |
| | 8 LA | β | **0.80%** | **0.72%** | **1.05%** | **0.94%** | **3.35%** |
| | | se | 0.0037 | 0.0039 | 0.0036 | 0.0061 | 0.0093 |
| | | N | 8 | 56 | 56 | 56 | 56 |
| | | t | | | 7 | | |
| | | T | | | 15,15,16,15,15,15,17 | | |
| Phase 1 | | β | **0.81%** | **0.13%** | **0.43%** | **-0.47%** | **-3.22%** |
| 1900-1930 | | se | 0.0066 | 0.0057 | 0.0075 | 0.1999 | 0.0629 |
| | | N | 13 | 21 | 21 | 21 | 21 |
| | | t | | | 2 | | |
| | | T | | | 18,10 | | |
| | Agricultural | β | **-0.13%** | **-0.32%** | **-0.39%** | **-0.24%** | **0.76%** |
| | | se | 0.0027 | 0.0040 | 0.0045 | 0.0825 | 0.0145 |
| | | N | 9 | 13 | 13 | 13 | 13 |
| | | t | | | 2 | | |
| | | T | | | 20,10 | | |
| | Mineral | β | **5.22%** | **0.36%** | **6.28%** | **-0.52%** | **-5.62%** |
| | | se | 0.1114 | 0.0171 | 0.0832 | 0.2136 | 0.0565 |
| | | N | 4 | 8 | 8 | 8 | 8 |
| | | t | | | 2 | | |
| | | T | | | 20,11 | | |
| Phase 2 | | β | **-0.02%** | **0.07%** | **0.12%** | **3.72%** | **4.10%** |
| 1931-1974 | | se | 0.0057 | 0.0039 | 0.0039 | 0.0099 | 0.0129 |
| | | N | 23 | 120 | 120 | 120 | 120 |
| | | t | | | 6 | | |
| | | T | | | 7,7,6,7,7,9 | | |
| | Industrialized | β | **1.74%** | **0.97%** | **1.27%** | **0.19%** | **-0.23%** |
| | | se | 0.0091 | 0.0050 | 0.0034 | 0.0152 | 0.0339 |
| | | N | 6 | 24 | 24 | 24 | 24 |
| | | t | | | 4 | | |
| | | T | | | 11,11,11,11 | | |
| | Non-Industriliz | β | **-0.32%** | **-0.19%** | **-0.13%** | **3.93%** | **4.26%** |
| | | se | 0.0079 | 0.0047 | 0.0045 | 0.0126 | 0.0143 |
| | | N | 17 | 84 | 84 | 84 | 84 |
| | | t | | | 6 | | |
| | | T | | | 7,6,6,7,7,9 | | |
| Phase 3 | | β | **0.56%** | **0.03%** | **0.07%** | **3.48%** | **3.76%** |
| 1975-2007 | | se | 0.0060 | 0.0037 | 0.0038 | 0.0050 | 0.0088 |
| | | N | 28 | 126 | 126 | 126 | 126 |
| | | t | | | 4 | | |
| | | T | | | 7,7,8,10 | | |
| | Good Institutions | β | **1.99%** | **2.06%** | **1.41%** | **3.09%** | **7.08%** |
| | | se | 0.0137 | 0.0139 | 0.0187 | 0.0092 | 0.0693 |
| | | N | 7 | 28 | 28 | 28 | 28 |
| | | t | | | 4 | | |
| | | T | | | 7,7,8,11 | | |
| | Painfull | β | **0.47%** | **0.95%** | **0.53%** | **4.44%** | **3.88%** |
| | | se | 0.0018 | 0.0032 | 0.0049 | 0.0072 | 0.0092 |
| | | N | 9 | 27 | 27 | 27 | 27 |
| | | t | | | 3 | | |
| | | T | | | 10,10,13 | | |
| | Vulnerable | β | **0.27%** | **0.19%** | **0.13%** | **3.23%** | **3.29%** |
| | | se | 0.0075 | 0.0046 | 0.0047 | 0.0089 | 0.0095 |
| | | N | 12 | 62 | 62 | 62 | 62 |
| | | t | | | 4 | | |
| | | T | | | 6,7,8,10 | | |

Table 2: **Results**. The Table reports the speed of convergence, standard errors, number of observations, number of periods for the panel data estimations, and the average lenght of each period.

Results of absolute convergence by single cross section and panel data regressions are robust since they coincide in finding either convergence or divergence in all groups. The difference in levels of speeds of convergence is small. In general, the speeds of convergence under the single cross section regression are very similar to the panel data estimations with time effects and these ones are higher than the estimations without time effects. The models including time dummies control for time differences so that the speed of convergence rises and approaches the single cross section results. Both, the single cross section regression and panel data with time effects regression can be interpreted as long-run convergence concepts because they omit time variation. However, as mentioned before, the exclusion of time variation is not always desirable. In any case, it seems that the difference is not an issue for the absolute convergence case. Inside almost all groups absolute convergence is present under all methods, except for the agricultural and non industrialized groups, where both have negative speeds of convergence but close to zero.

Regarding conditional convergence, the results are also robust between the models with and without time effects. In general they don't contradict each other regarding convergence or divergence but they differ more in their rates compared to the absolute convergence results. Conditional convergence including time effects is, in general, higher than without time effects, since what is left after controlling for country and time effects is, of course, a very high speed of convergence which could be interpreted as artificial since it gets rid in a way of time and country variation. For this reason I focus more on the non time effects models. All groups show conditional convergence (without time effects) except the agricultural and the mineral groups, with negative speeds of convergence close to zero. Conditional convergence tends to be higher than absolute convergence. The explanation is that countries converge faster after their steady-state and country specific effects are controlled for.

The results show that during the first phase, countries converge in an absolute way, but diverge in a conditional. In other words, after controlling for each country specific characteristic including the steady-state, and time variation, countries diverge. This implies that their observed absolute convergence is due to common factors determined by the international markets and their demand for Latin American products, since these are crucial in this phase. One can also say that there is long run convergence rather than short run convergence. Absolute convergence is found to be less than 1% per year, whereas conditional convergence without time effects is -0.5%. Finally, there is $\sigma$-convergence overall.

In the same way, the mineral countries converge in an absolute way (long run) at a speed around 6% per year, while after conditioning for each country specific characteristics the speed is -0.5% . One crucial common factor for the mineral countries convergence is the WWI (1914-1918). The WWI accelerated the shift in trade and investment structures in Latin America. The demand for Latin American minerals increased together with investment in the mineral sectors. According to Furtado (1981) the war stimulated the industrial growth in Latin America. Additionally, the mineral countries show some sort of $\sigma$-convergence.

On the contrary, the agricultural countries diverge in the long run and short run (without time effects) at speeds less than 1%. Furthermore, Figure 3 shows that the agricultural group have high levels of dispersion, which stay constant for around the first 20 years, and then decrease in levels. The reason for this overall divergence may be the lack of accumulation of capital and technology investment that characterizes the agricultural sector, compared, for example, to the mineral sector.

During the second phase of industrialization, countries show an absolute convergence rate close to zero but a conditional of around 4% (with and without time effects). The reason for the lack of absolute convergence and the presence of conditional convergence may be that during this phase, countries went on their own way of development by industrializing or not, such that each country's own experience was more important in determining convergence than the external common factors that had been important. Therefore, once country specific characteristics (and time effects) are controlled for, countries converge. During this phase, income dispersion increased.

With or without controlling for country specific characteristics, the industrializers do not diverge. Their absolute speed is around 1% and the conditional 0.2% (without time effects). The reason for their non divergence could be the industrialization process. They were able to succeed, despite all the distortions that the industrialization via import substitution brought, in innovating some industries and creating capital such that technology transmission was more fluent, even though countries went on in their own way and had big differences among them. In terms of $\sigma$-convergence, the industrializers show a very clear improvement on their pattern of income dispersion.

On the contrary, the non-industrializers diverge in an absolute way (at speeds below -1%) and converge only after controlling for country and time specific effects, at a speed of around 4%. This implies that they diverge between them but each country converge to their own steady-state. Instead of industrializing by producing capital goods and creating intermediate input industries, some stayed as primary exporters because of their strong dominating primary export sector, which in the majority of the cases was overprotected by the government, or because the government created inefficient industrial sectors that were not able to succeed. Others were based on different models as Cuba that was based on a centrally planned model and the Caribbean that were based on a model of promotion of exports by invitation. Moreover, there is a clear $\sigma$-divergence among these countries.

Lastly, during the third phase, countries converge in an absolute and conditional sense but at very different speeds. Their absolute convergence is less than 1% and conditional around 3.5%, meaning that common external factors were determining the path, like the debt crises that the region experienced, but also that each country's own experience was important for convergence, such as the link between globalization and welfare that each country provided. Regarding income dispersion, it has been constant but at rather high levels.

The good institution group could develop a connection between globalization and welfare by having acceptable welfare standards of living, good relations between the public and private sector, democratic values, and

integration to the global markets among others. All of this characteristics are certainly helpful for capital accumulation and technology diffusion. Therefore, the results show absolute and conditional convergence. Both are close to each other, around 2%. Nevertheless, after controlling for time effects, the speed of convergence is 7%. As for the total phase, the income dispersion is constant but at very low levels.

The painful group is characterized by having had weak institutions that lead to bad results either in terms of growth, welfare, or both, which most likely did not motivate technology diffusion nor capital accumulation. Nonetheless I find convergence by all means at different rates. Their absolute convergence is around 0.6% and their conditional is around 4%. This implies that they vaguely converge between them but each converge to their own steady-state. Their income dispersion is constant.

In a similar way, the vulnerable group, composed by the Caribbean countries which were more severely affected by the adverse trends of the 1970s and 1980s than the rest of Latin America, converge vaguely(around zero) in an absolute and strongly in a conditional way (around 3%). This group shows a constant rather high income dispersion compared to the other groups of this phase.

For the eight countries with most data, I find absolute and conditional convergence (without time effects) at speeds of around 1%. This somewhat harmonically convergence is supported by the $\sigma$-convergence from Figure 2. I also calculate $\beta$-convergence for all countries and all periods, and I found null absolute convergence and a conditional convergence of around 2%.

# 6 Discussion

**Alternative groups**

The validity of the division of groups based on economic history is not unique. There could be other possible clubs where convergence can be studied. One way could be by grouping those countries that are part of an economic integration agreement, another by grouping countries with geographical vicinity, and there may be other ways. Here I discuss the first two alternatives.

As Soltelsek (2001) mentions, economic integration among countries is linked to economic convergence. Theory of economic integration studies the creation of a common market as a process that goes together with economic growth. This process tends to be deepened via monetary and political integration. One of the main objectives of integration process is to increase the standards of living of its population and diminish the existent disparities in the standards of living of their citizens, and therefore convergence is expected.

There are three phases of convergence in an integration process, and there are six stages of a process of integration (Heirman, 2001) . For every two stages of economic integration one phase of convergence is reached. Convergence of basic instruments like common external tariffs and commercial regulation among its members and to other countries is reached under a preferential trading area and free trade area. Convergence in macro-

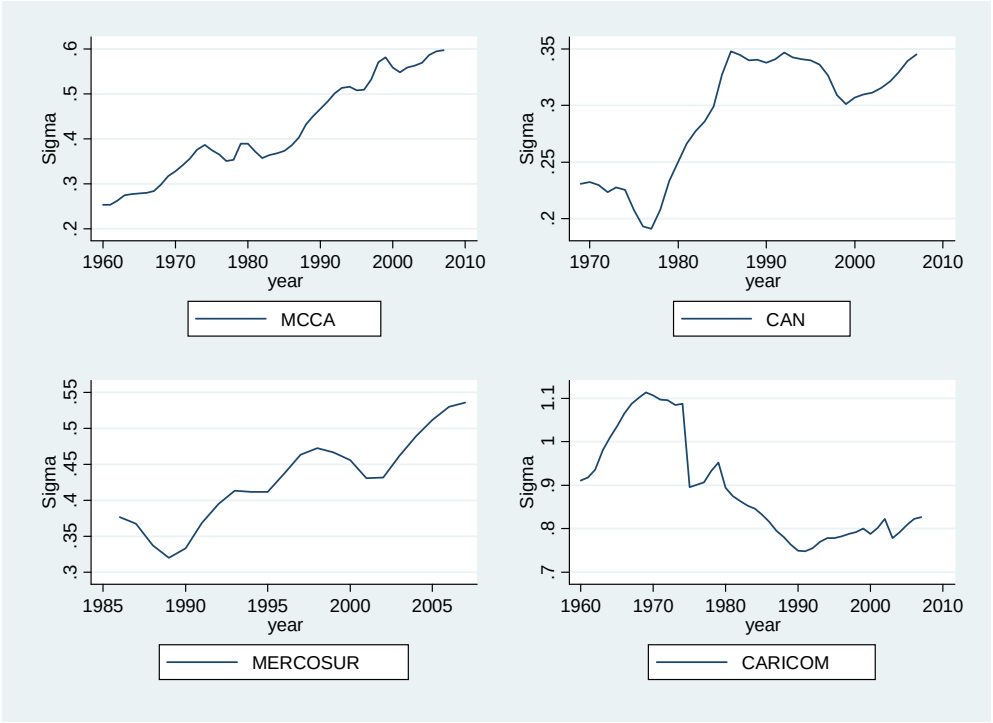


Figure 4: **GDP per capita dispersion in Latin America per custom union.** Standard deviation of the logarithm of the smoothen GDP per custom union.

economic, fiscal and social policies, is reached under customs union and common market integration processes. Finally, convergence in real terms is reached under economic and monetary union, and complete integration.

Currently, the only integration process that is in the last phase of convergence and last stage of economic integration is the European Union. Nevertheless, Walz (1999) tested the hypothesis that integration has promoted economic convergence among the European countries and found that it is rejected. It seems that the economic convergence created by the European Union is across regions rather than countries.

In Latin America the most advanced economic integration processes are still in the third stage of economic integration: custom unions. Consequently, they must be in the second stage of convergence. Still, here I test for convergence in real terms. There are four custom unions in the region: the MCCA (*Mercado Común Centroamericano*-Central American Common Market), CAN (*Comunidad Andina*-Andean Community), CARICOM (Caribbean Community) and MERCOSUR. (*Mercado Común del Sur* - Southern Common Market)[20].

All the unions show a clear pattern of sigma divergence except for CARICOM (See Fig.4). Regarding absolute convergence (Table 3), there is null convergence for CARICOM (less than 0.2%), and there is divergence for the

[20]MCCA was created in 1960, and it is composed by five countries: Guatemala, El Salvador, Honduras, Nicaragua, and Costa Rica. CAN was installed in1969, and nowadays has four members: Bolivia, Ecuador, Colombia, and Peru. Chile and Venezuela were members as well, but Chile withdrew in 1976 and Venezuela in 2006. CARICOM was created in 1975, and includes: Antigua and Barbuda*, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat*, Saint Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, Suriname*, and Trinidad and Tobago (* indicates the countries are excluded from the analysis due to lack of data). MERCOSUR was founded in 1986 and currently has five members: Argentina, Brazil, Paraguay, Venezuela and Uruguay.

rest of the unions (at least under the single cross section). Regarding **conditional** convergence, it is found in all unions with or without time effects, except for MERCOSUR which shows conditional divergence without time effects. Overall, the results of absolute and sigma divergence validate what was expected, that there is a low degree of integration in the region in order to reach absolute output convergence[21].

| Groups of countries | | | Single cross section | Panel data | | | |
|---|---|---|---|---|---|---|---|
| | | | | Absolute | | Conditional | |
| | | | t=1 | t>1 | Time Effects | t>1 | Time Effects |
| Integration Process | | | | | | | |
| 1975-2007 | CARICOM | β | **0.09%** | **0.23%** | **0.21%** | **4.93%** | **4.56%** |
| | | se | 0.0095 | 0.0047 | 0.0047 | 0.0115 | 0.0091 |
| | | N | 10 | 47 | 47 | 47 | 47 |
| | | t | | | 4 | | |
| | | T | | | 7,8,8,8 | | |
| 1960-2007 | MCCA | β | **-1.09%** | **-0.10%** | **-1.19%** | **4.36%** | **0.57%** |
| | | se | 0.0088 | 0.0082 | 0.0051 | 0.0156 | 0.0099 |
| | | N | 5 | 30 | 30 | 30 | 30 |
| | | t | | | 6 | | |
| | | T | | | 8,8,8,8,8,8 | | |
| 1969-2007 | CAN | β | **-0.17%** | **0.60%** | **0.38%** | **1.76%** | **6.13%** |
| | | se | 0.0161 | 0.0076 | 0.0102 | 0.0182 | 0.0291 |
| | | N | 4 | 20 | 20 | 20 | 20 |
| | | t | | | 5 | | |
| | | T | | | 8,8,8,8,7 | | |
| 1986-2007 | MERCOSUR | β | **-1.70%** | **-2.50%** | **-1.90%** | **-4.90%** | **4.12%** |
| | | se | 0.0011 | 0.0063 | 0.0028 | 0.0046 | 0.1508 |
| | | N | 4 | 12 | 12 | 12 | 12 |
| | | t | | | 3 | | |
| | | T | | | 7,7,8 | | |
| Others | | | | | | | |
| | 6 LA | β | **0.73%** | **0.20%** | **0.66%** | **0.04%** | **1.46%** |
| | | se | 0.0020 | 0.0019 | 0.0018 | 0.0019 | 0.0097 |
| | | N | 6 | 42 | 42 | 42 | 42 |
| | | t | | | 7 | | |
| | | T | | | 15,15,16,15,15,15,17 | | |
| | | β | **1.15%** | **0.47%** | **0.85%** | **0.56%** | **2.28%** |
| | Astorga et.al. (2005) | se | 0.0047 | 0.0032 | 0.0028 | 0.0049 | 0.0060 |
| | | N | 6 | 60 | 60 | 60 | 60 |
| | | t | | | 10 | | |
| | | T | | | 10x10 | | |
| | Dobson et.al.(2002) | β | **0.39%** | **0.31%** | **0.00%** | **4.25%** | **3.04%** |
| | | se | 0.0043 | 0.0026 | 0.0028 | 0.0081 | 0.0184 |
| | | N | 19 | 114 | 114 | 114 | 114 |
| | | t | | | 6 | | |
| | | T | | | 5,5,5,5,5,5 | | |

Table 3: **Results**. The Table reports the speed of convergence, standard errors, number of observations, number of periods for the panel data estimations, and the average lenght of each period.

[21] Holmes (2005) and Madariaga et.al.(2003) found convergence for the MCCA and the MERCOSUR unions. They can be compared to the conditional convergence results in this paper. Blyde (2005) found increasing dispersion in MERCOSUR, which can be compared to the $\sigma$-divergence here.

Another interpretation of these results is that the custom unions are also showing grouping by geography. The MCCA groups all countries from Central America, CAN countries from the Andean region, CARICOM the Caribbean countries and MERCOSUR the southern cone countries. Therefore, it seems that geography does not determine convergence either.

Grouping by economic history is the preferred choice. It makes sense that economic processes that change in time according to policies, external shocks, and regional trends draw different patterns of convergence. Besides, the long span of data allows analyzing the most important changes that occurred in Latin America for more than a century. Regarding the success of the grouping, only two groups, the agricultural and the non-industrializers, showed non convergence under at least two concepts. This may imply that the convergence attractors fail. One could say that the technological diffusion was low or that the capital augmentation was not enough in both clubs.

**Econometric Issues**

Regarding omitted variables, it may not be convincing not to have other variables in the growth equations than the initial output[22], country-specific characteristics, including the steady state, and the time effects controlling for the external conditions. In fact, I have introduced a lot of controls by dividing the countries into periods and groups according to the well known economic history events occurred in the region. This could be interpreted as including external shocks, sector dummies, export product characteristics, degree of industrialization, and institutions information.

Measurement errors in the GDP per capita at the beginning of each period (the regressor) can be present due to poor calculations and they may be temporary. This problem is diminished by smoothing the data such that the temporal errors tend to disappear.

Another topic is unbalanced panel data, some countries do not have information, especially for the first years. This can be a problem if the reason for missing information is related to the error term, but since the reason is connected to the regressor, our panel data estimators are valid. It is clear that the reason for the lack of data is due to the development of each country. At the beginning of the century, only strong economies had data. Therefore, missing information is due to low levels of GDP at the beginning of each period.

**Convergence Concepts**

The different concepts of convergence used here are mixed. Roughly speaking, absolute convergence or catching up convergence should only be measured among all countries and all years before making any sort of grouping or adding any controls (first line in Table 2).

[22] Actually, the initial output of a period has a strong explanatory power on the average growth in general. Barro and Sala-i-Martin (2004) make a BACE analysis where the intial output is strongly related to growth.

Absolute convergence measured for each period and group can be considered already as conditional convergence since some sort of controls were introduced. Still, inside each group I measured absolute convergence in the sense that no extra controls are included. Additionally, when dividing the analysis by groups that vary across time, one could refer to club convergence as well.

In practice both club and $\beta$-convergence can be measured by the neoclassical growth models (Galor, 1996). Club convergence analysis points out that the initial conditions determine the club to which each country converges. One way to test the existence of club convergence is by setting a certain threshold for the initial conditions. If the initial conditions of certain economies are above the threshold they converge to one club, and if they are below they converge to another (Chumacero, 2002). Here, I do something similar: the threshold is determined by economic shocks given in history. Since it is possible to look back in history it is possible to identify convergence clubs according to how each country responded to different economic shocks together with their internal characteristics.

In conclusion, the concepts used here cover them all: absolute/catching up, conditional, club and $\sigma$-convergence.

**Link to the LA-8**

From all the groups where both absolute and conditional convergence were found, two showed more similar speeds of absolute and conditional convergence than the others: the industrializers and the good institutions[23]. The industrializers and good institutions groups are composed of almost the same countries. The countries that coincide in both groups number six: Argentina, Brazil, Chile, Colombia, Mexico and Uruguay, which are at the same time all included in the LA-8 group plus Peru and Venezuela. Therefore, the observed strong sigma-convergence found among the LA-8 is due to the presence of these six countries.

The speeds of convergence for the six countries for the whole period are shown in Table 3. All types of convergence are found, and the absolute and conditional convergence are quite similar, around 1%. Notice that the speeds of convergence are lower than in the 8LA. The reason is that 8LA includes Venezuela that benefited from the oil to catch up to the others[24].

[23] In order to compare speeds I take into account only panel data estimators. For absolute convergence I consider the one with time effects, since is closer to the single cross sections regression-the long run convergence, and for conditional convergence, I take the one without time effects, because as seen before, the concept with time effect does not take into account the time variation which actually interests us.

[24] Note as well that four out of the six countries are included in the list of the rich club found by Blydes (2006). The author found this club because of their level of income but did not explain the forces, events, or background behind his findings.

## Conclusions

This paper analyzes the most important and known historical facts of 32 Latin American countries over more than a century (1900-2007), from where different phases and several groups are identified as having each a specific convergence pattern. I use the solid theoretical framework of Barro and Sala-i-Martin (2004) where they employ a neoclassical growth model, which is the most used in the literature and reaches concrete results about convergence. This kind of model can also be used to analyze club convergence (Galor, 1996). Based on Thorp (1998), I detect three phases and during each phase two to three groups where convergence is analyzed. Then, with data from Madisson (2003) and the World Bank (2009), I use non-linear least squares with single cross section and fixed effect panel data regressions to estimate the speeds of convergence for each phase and group. In this way, by grouping countries with similar characteristics, I avoid using arbitrary determinants of growth, I solve the problem of lack of data at the beginning of the century, and I expand the usual range of data analyzed so far.

During the first phase, from 1900 to 1930, since Latin American countries development was focused on primary product exports, two groups were identified: the mineral and agricultural products exporters. Throughout the period and for the mineral countries, there is absolute but not conditional convergence, and some degree of $\sigma$-convergence. This suggests that their convergence is determined by common factors as the international markets and the demand for Latin American products, rather than by specific country characteristics. For the mineral group, the WWI is crucial since it increased their exports and investments. On the contrary, the agricultural countries converged only after controlling for specific country characteristics, which suggests that there was not enough capital accumulation to ease the convergence process.

Throughout the second phase, from 1931 to 1974, when countries followed a model of import substitution by industrialization, two groups are identified: those that were able to industrialize, despite all the distortions that the model brought, and the non-industrializers which failed to industrialize for different reasons. During the entire period and for the non industrializers there is strong conditional convergence compared to absolute and $\sigma$-convergence. Each country specific characteristic is more important for convergence than the common factors. For the industrializers group there is absolute, conditional, and $\sigma$-convergence. This suggests that the process of industrialization, despite the distortions, brought innovation and capital which eased the process of convergence.

During the third phase, from 1975 to 2007, after the arise of a more social concern of development and a willingness to participate in the globalization process, three groups are identified: good institutions countries, which developed institutions that could deal with growth and/or welfare, painful processes countries, which were traumatized by the debt crises adjustment, and vulnerable countries, the Caribbean, which are different from the rest and are characterized by being vulnerable to external factors. Throughout the whole period and for all groups there is absolute, conditional, and constant $\sigma$-convergence. However, the only group with similar

rates of absolute and conditional convergence and with low levels of dispersion is the good institution group. This robust convergence among the good institution countries show that their ability to develop a connection between globalization and welfare by having acceptable welfare standards of living, good relations between the public and private sector, democratic values, and integration in the global markets among others help for capital accumulation and technology diffusion, the main forces behind convergence.

Another possible force behind convergence could be integration agreements. I analyze the most advanced integration processes in the region and do not find strong convergence results because the degree of integration in the region is still low.

Overall, two groups show strong evidence of convergence under all concepts. Their speed of $\beta$-convergence is around 2%. Countries in these groups were able to succeed in industrializing and/or building good institutions. Therefore, as long as countries follow appropriate policies on physical and human capital accumulation, the difference between countries in Latin America will slowly disappear over time, as it did between some countries already.

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# Appendix

| Country | mean | sd | max | min | obs |
|---|---|---|---|---|---|
| Argentina | 3,543 | 428 | 4,271 | 2,784 | 31 |
| Brasil | 867 | 137 | 1,118 | 704 | 31 |
| Chile | 2,469 | 321 | 3,225 | 1,970 | 31 |
| Colombia | 1,209 | 136 | 1,489 | 998 | 31 |
| Costa Rica | 1,643 | 48 | 1,725 | 1,589 | 11 |
| Cuba | 1,517 | 78 | 1,572 | 1,462 | 2 |
| Guatemala | 1,485 | 135 | 1,706 | 1,315 | 11 |
| Honduras | 1,352 | 121 | 1,542 | 1,234 | 11 |
| Jamaica | 790 | . | 790 | 790 | 1 |
| Mexico | 1,714 | 149 | 1,925 | 1,393 | 31 |
| Nicaragua | 1,367 | 117 | 1,585 | 1,253 | 11 |
| Peru | 1,096 | 200 | 1,508 | 837 | 31 |
| El Salvador | 983 | 37 | 1,047 | 926 | 11 |
| Uruguay | 2,977 | 462 | 4,018 | 2,226 | 31 |
| Venezuela | 1,354 | 777 | 3,309 | 809 | 31 |
| Total | 1,801 | 926 | 4,271 | 704 | 306 |

Table 4: **Description of GDP per capita - Phase 1: 1900-1930**. Mean, standard deviation maximum and minimum value, and number of observations per country.

| Country | mean | sd | max | min | obs |
|---|---|---|---|---|---|
| Argentina | 5,281 | 1,217 | 8,140 | 3,618 | 44 |
| Bolivia | 1,872 | 235 | 2,430 | 1,595 | 30 |
| Brasil | 1,971 | 781 | 4,051 | 1,024 | 44 |
| Chile | 4,000 | 836 | 5,483 | 2,420 | 44 |
| Colombia | 2,302 | 544 | 3,580 | 1,478 | 44 |
| Costa Rica | 2,441 | 834 | 4,382 | 1,506 | 44 |
| Cuba | 1,848 | 353 | 2,324 | 1,070 | 44 |
| Dominican Republic | 1,392 | 257 | 2,061 | 1,072 | 25 |
| Ecuador | 2,155 | 556 | 3,378 | 1,326 | 36 |
| Guatemala | 2,281 | 449 | 3,257 | 1,417 | 44 |
| Honduras | 1,348 | 180 | 1,624 | 1,009 | 44 |
| Haiti | 1,006 | 66 | 1,083 | 873 | 30 |
| Jamaica | 2,500 | 948 | 3,965 | 850 | 30 |
| Mexico | 2,783 | 992 | 4,998 | 1,482 | 44 |
| Nicaragua | 1,926 | 619 | 3,095 | 1,042 | 44 |
| Panama | 2,732 | 794 | 4,227 | 1,889 | 30 |
| Peru | 2,606 | 841 | 4,126 | 1,264 | 44 |
| Puerto Rico | 4,266 | 1,684 | 7,165 | 2,175 | 25 |
| Paraguay | 1,708 | 151 | 2,134 | 1,503 | 36 |
| El Salvador | 1,576 | 478 | 2,427 | 890 | 44 |
| Trinidad and Tobago | 6,329 | 1,698 | 8,952 | 3,784 | 25 |
| Uruguay | 4,433 | 751 | 5,368 | 3,056 | 44 |
| Venezuela | 7,239 | 2,818 | 10,535 | 2,733 | 44 |
| Total | 2,867 | 1,858 | 10,535 | 850 | 883 |

Table 5: **Description of GDP per capita - Phase 2: 1931-1974**. Mean, standard deviation maximum and minimum value, and number of observations per country.

| Country | mean | sd | max | min | obs |
|---|---|---|---|---|---|
| Argentina | 8,014 | 853 | 10,229 | 6,646 | 33 |
| The Bahamas | 12,502 | 1,405 | 13,894 | 8,648 | 28 |
| Belize | 3,386 | 1,080 | 5,288 | 2,120 | 33 |
| Bolivia | 2,446 | 210 | 2,822 | 2,096 | 33 |
| Brasil | 5,174 | 475 | 6,225 | 4,248 | 33 |
| Barbados | 9,304 | 1,018 | 11,099 | 7,375 | 25 |
| Chile | 7,629 | 2,590 | 12,846 | 4,492 | 33 |
| Colombia | 4,862 | 700 | 6,345 | 3,652 | 33 |
| Costa Rica | 5,238 | 825 | 7,084 | 4,299 | 33 |
| Cuba | 2,561 | 354 | 3,029 | 1,880 | 30 |
| Dominica | 1,972 | 507 | 2,594 | 1,137 | 31 |
| Dominican Republic | 2,847 | 651 | 4,296 | 2,125 | 33 |
| Ecuador | 4,127 | 305 | 4,903 | 3,510 | 33 |
| Grenada | 3,148 | 820 | 4,182 | 1,827 | 28 |
| Guatemala | 3,323 | 234 | 3,664 | 2,950 | 33 |
| Guyana | 3,108 | 315 | 3,669 | 2,576 | 33 |
| Honduras | 1,886 | 81 | 2,005 | 1,610 | 33 |
| Haiti | 969 | 183 | 1,261 | 748 | 33 |
| Jamaica | 3,508 | 268 | 3,951 | 3,018 | 33 |
| St. Kitts and Nevis | 3,729 | 1,548 | 6,148 | 1,580 | 31 |
| St. Lucia | 2,121 | 546 | 2,733 | 1,199 | 28 |
| Mexico | 6,361 | 606 | 7,573 | 5,126 | 33 |
| Nicaragua | 1,810 | 581 | 3,222 | 1,327 | 33 |
| Panama | 5,422 | 903 | 7,801 | 4,156 | 33 |
| Peru | 3,760 | 444 | 4,705 | 2,928 | 33 |
| Puerto Rico | 10,238 | 2,504 | 14,965 | 7,095 | 27 |
| Paraguay | 3,083 | 269 | 3,362 | 2,226 | 33 |
| El Salvador | 2,453 | 278 | 2,919 | 2,084 | 33 |
| Trinidad and Tobago | 11,989 | 2,994 | 20,429 | 9,195 | 33 |
| Uruguay | 6,888 | 983 | 8,997 | 5,384 | 33 |
| St. Vincent and the Grenadines | 1,948 | 589 | 3,058 | 988 | 33 |
| Venezuela | 9,097 | 943 | 11,115 | 7,583 | 33 |
| Total | 4,773 | 3,166 | 20,429 | 748 | 1,020 |

Table 6: **Description of GDP per capita - Phase 3: 1975-2007**. Mean, standard deviation maximum and minimum value, and number of observations per country.

| Groups of countries | | Argentina | The Bahamas | Belize | Bolivia | Brasil | Barbados | Chile | Colombia | Costa Rica | Cuba | Dominica | Dominican Republic | Ecuador | Grenada | Guatemala | Guyana | Honduras | Haiti | Jamaica | St. Kitts and Nevis | St. Lucia | Mexico | Nicaragua | Panama | Peru | Puerto Rico | Paraguay | El Salvador | Trinidad and Tobago | Uruguay | St. Vincent and the Gre | Venezuela |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 8 LA | 1 | | | | 1 | | 1 | 1 | | | | | | | | | | | | | | 1 | | | 1 | | | | | 1 | | 1 |
| | New | 1 | | | | 1 | | 1 | 1 | | | | | | | | | | | | | | 1 | | | | | | | | 1 | | |
| Period 1 1900-1930 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Agricultural | 1 | | | | 1 | | | 1 | 1 | 1 | | | | | 1 | | 1 | | | | | | 1 | | | | | 1 | | 1 | | |
| | Mineral | | | | | | | 1 | | | | | | | | | | | | | | | 1 | | | 1 | | | | | | | 1 |
| Period 2 1931-1974 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Industrialized | 1 | | | | 1 | | 1 | 1 | | | | | | | | | | | | | | 1 | | | | | | | | 1 | | |
| | Non-Industriliz | | | | 1 | | | | | 1 | 1 | | 1 | 1 | | 1 | | 1 | 1 | 1 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | 1 |
| Period 3 1975-2007 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Good Institutions | 1 | | | | 1 | | 1 | 1 | 1 | | | | | | | | | | | | | 1 | | | | | | | | 1 | | |
| | Painfull | | | | 1 | | | | | | | | | 1 | | 1 | | 1 | | | | | | 1 | | 1 | | 1 | 1 | | | | 1 |
| | Vulnerable | | 1 | 1 | | | 1 | | | | 1 | 1 | 1 | | 1 | | 1 | | 1 | 1 | 1 | 1 | | | 1 | | 1 | | | 1 | | 1 | |
| Regional Blocks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1960-2007 | MCCA | | | | | | | | | 1 | | | | | | 1 | | 1 | | | | | | 1 | | | | | 1 | | | | |
| 1969-2007 | CAN | | | | 1 | | | | 1 | | | | | 1 | | | | | | | | | | | | 1 | | | | | | | |
| 1975-2007 | CARICOM | | 1 | 1 | | | 1 | | | | | 1 | | | 1 | | 1 | | 1 | 1 | 1 | 1 | | | | | | | | 1 | | 1 | |
| 1986-2007 | MERCOSUR | 1 | | | | 1 | | | | | | | | | | | | | | | | | | | | | | 1 | | | 1 | | |
| Other literature | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Astorga et.al. | 1 | | | | 1 | | 1 | 1 | | | | | | | | | | | | | | 1 | | | | | | | | | | 1 |

Table 7: **List of countries per group and period**. 1 Indicates the participation in the groups and periods

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