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Convergence Clubs determined by Economic History in Latin America

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Abstract

The concept of club convergence has been widely used in empirical analysis to group countries in clubs with similar development paths. However, there is no unified agreement on how to identify the clubs in the first place. In this paper, I argue that economic history can guide us to identify clubs. The argument is that economic history helps us understand when, where, and how institutions are formed and since institutions determine the way scarce resources are used by their chosen policies, it allows us to understand economic growth. Even though Latin America is typically considered a club itself, due to common characteristics, such as language, geography, religion and history, it still exhibits differences across countries. I study a period of more than 100 years, from 1900 to 2007, where first, I identify two main common external shocks to the region: the Great Depression in the 1930s and the oil price shock in 1974. Second, I classify countries in clubs according, first, to their natural resources endowments, and then, after each shock, to their policy-response to the shocks. Lastly, I test convergence within each club. I find significant and positive convergence speed within each of the clubs, implying that this way of finding clubs should not be ruled out.

1 Introduction

The detection of income disparities across clubs of economies can help determine how to speed up the process of economic development and understand the sources of differences in growth performances. In theory, the reasons behind club convergence could be several, among these: the existence of some threshold level in the endowment of strategic factors of production, non-convexities or increasing returns, similarities in preferences and technologies, and government policies and institutions (Canova, 2004; and Azariadis, 1996). Empirically, there is no unified agreement on how to identify clubs. Most researchers (e.g. Durlauf and Johnson, 1995; Paap and Van Dijk, 1998; Desdoigts, 1998; Hansen, 2000; Canova, 2004; Owen, et al., 2009) lean towards the approach of letting the data decide the clubs. They usually study the shape of the distribution of income (or capital) and focus on finding an income (or capital) threshold to divide countries into clubs, or the thresholds are determined beforehand. However, the division of clubs by income (or capital) is not very informative with respect to the forces behind the heterogeneity in income (or capital) in first place.

Although Latin America is typically considered a club itself, due to its common characteristics, such as language, geography, religion, history and policies, it exhibits differences across countries (see Figure 1). Dispersion in GDP per capita has been increasing on average over the period 1950-2005 in Latin America, whereas it has been decreasing among the OECD countries. Then a relevant question is, Why diversity in growth trajectories in a region with so many common roots? Some candidates for an explanation come to mind: commodity lottery/geography, poor market integration, colonial heritage, and differences in economic policies, among others.

Some researchers have gone far in time to explain the diversity in development paths in Latin America and the connection to institutions. Acemoglu, Johnson and Robinson (2001) find that there is a strong correlation between early institutions and institutions today. In the specific case of the Americas they distinguish between regions that were settled by Europeans and regions that, due to high settler mortality, the Europeans established "extractive states" instead. The latter model paved the way for extractive states even after political independence in the nineteenth century. In a later work, Acemoglu and Robinson (2012, pp. 114-115) restate their point that the extractive political

and economic institutions of the conquistadors have endured and condemned much of the region to poverty. There are, however exceptions. Argentina and Chile have fared better than most. Because they had few indigenous people or mineral riches (exploitable at the time) they were "neglected" by the Spanish. Consequently, there are differences even in this dismal picture of colonial heritage. Similarly, Engermann and Sokoloff (2002) argue that institutions are endogenous, and that the roots of the disparities in the extent of the inequality that we observe today lay in the initial factor endowments. Through comparative studies of suffrage, public land and schooling policies they document systematic patterns by which the societies in the Americas, that began with more extreme inequality or heterogeneity in the population were more likely to develop institutional structures that greatly advantaged members of the elite by providing them with more political influence and access to economic opportunities.

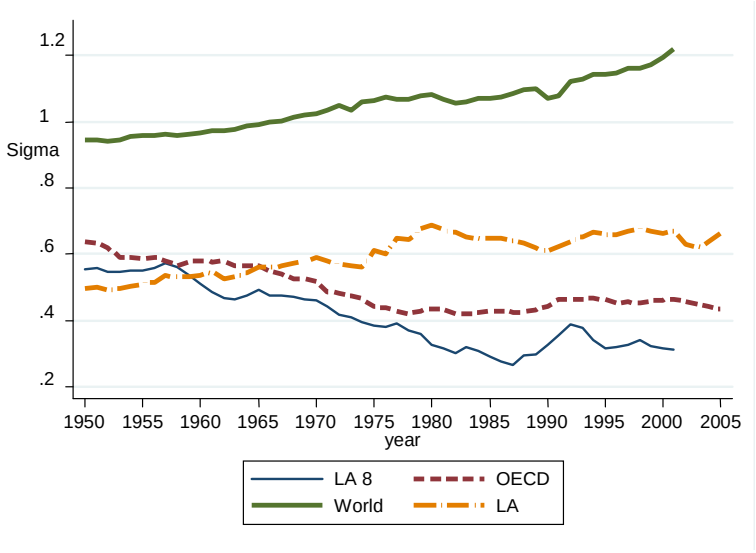

Figure 1. GDP per capita dispersion in the World, OECD, Latin America and eight Latin American countries (LA8 - Argentina, Brazil, Chile, Colombia, Mexico Peru, Uruguay and Venezuela). Standard deviation of the logarithm of GDP per capita.

Empirical research on convergence in Latin America is still scarce compared to other regions[1], and only one other study incorporates economic history features into the analysis: Astorga et al. (2005). They do a time-series analysis for each of their six countries of study, during 1900-2000,

[1] There are only nine cross-country studies on convergence: Blyde, 2005 and 2006; Holmes, 2005; Astorga et. al., 2005; Dobson and Ramlogan, 2002a and 2002b; Utrera, 1999; Dabus and Zinni, 2005; and Madariaga et.al, 2003.

where they find different breaks for each of them. They conclude that there are two external shocks affecting the six economies simultaneously: in the 1930s due to the Great Depression and in the 1980s due to the shift in US monetary policy and debt crises[2]. They find convergence between the six countries by using panel data and error correction models, and conclude, among other things, that there is convergence among the six countries but it seems there is divergence between the rest, forming two distinct convergence clubs (they do not test for this). They say that the "rest" show an inferior pattern of growth compared to the six, due to lower growth rate and greater vulnerability, which may possibly relate their greater vulnerability to the external shocks.

This study pretends as well, to answer the question posted earlier of why diversity in growth trajectories in a region with common roots and fill in the gap in the literature by analyzing, empirically, the existence of club convergence in 32 Latin American countries over more than 100 years, more than any other study.

I analyze club formation in a different way than the conventional procedures (income or capital threshold determination) and incorporate the institution link to growth. I examine sources of heterogeneity on the basis of economic history, which informs us on the different initial endowments, the most important common external shocks and the policy-responses. Such historical events shape the way institutions are formed, and institutions determine the way scarce resources are used. As mentioned by Easterly (2003), technology is endogenous to the institutions that make adoption of better production techniques likely. The institution link in terms of Acemoglu and Robinson (2012) and Engerman and Sokoloff (2002) enters in the analysis when I, first, divide the clubs according to their factor endowments. However, after the external shocks hit the region, a mix of countries of different endowments try to change their pattern of development while others remain in the same path. In other words, I recognize that there is a legacy from the colonizers but I also accept that external shocks and certain circumstances can also change this legacy by the decision and possibilities of the policy makers.

The criteria of division of clubs follow three steps. First, I identify the main common external shocks that changed the development patterns in the region: the Great Depression in 1930s and the

[2] However, from my point of view, the shift in US monetary policy and debt crises are consequences of the exogenous shock of the increase in oil prices in 1974.

oil price shock in 1974. Then, I classify countries in clubs according to first, their initial endowment of natural resources and then according to their policy-response to the shocks. Here, I focus on information of the policies rather than outcomes so that the results are not driven by the selection of the club thresholds in the first place. Finally, I test for convergence within each club.

Before 1930, I define two clubs according to their exporting product: the mineral and agricultural producers. After the Great Depression I follow Diaz (1984) classification of clubs, according to passive or reactive countries, where the reactive responded autonomously to protect themselves, while the passive did/could not. After the oil price shock, I classify the clubs according to the Lora index (Lora, 2001), which describes to what extent countries applied structural reforms to liberalize their economies. I also have the Caribbean countries as a separate club.

In connection to growth theory, under multiple-equilibria models, each historical watershed represents an opportunity to modify the set of initial conditions and to escape from a development trap, whereas in the Solow model approach, those historical points represent critical changes in policy parameters and a redefinition of the steady state. The empirical analysis cannot distinguish between these two kinds of models.

The following section discusses the background of the paper. First it discusses the theoretical aspects behind club convergence, then it summarizes the prior research in Latin America, and finally it reviews the common economic history events in the region. Section 3 describes the empirical specification of the paper, which consists of the division of clubs and the econometric specification. Section 4 presents the results and Section 5 discusses the strengths and weaknesses of the approach. Finally, I present the conclusions. The data details are presented in the appendix.

2 Background

2.1 Connection to theory: from the Solow-Swan model to multiple equilibrium models

The concept of economic convergence has been discussed through many years since Ramsey (1928) until now. This section does not pretend to do an exhaustive summary and analysis of all

growth theories[3], but instead it discusses and compares, in general terms and briefly, the two most important theories behind club convergence that emerge from the most basic version of Solow-Swan model and the multiple equilibria models.

The neoclassical growth models, of which the simplest version is Ramsey-Solow model, arrive at a growth equation where convergence can be estimated by[4],

$$\left(\frac{1}{T}\right).\log\left(y_{iT}/y_{i0}\right) = x - \frac{\left(1-e^{-\beta T}\right)}{T}\cdot\log\left(y_i{}^*/y_{i0}\right) + u_{it} \qquad (1)$$

where the average growth rate in the interval from 0 to T for country *i*, $\left(\frac{1}{T}\right).\log\left(y_{iT}/y_{i0}\right)$, is related negatively to the initial output y_{i0} in relation to the steady state output $y_i{}^*$, and positively to the technology growth x, while keeping β (speed of convergence) and T (period) constant.

Equation (1) describes *conditional β-convergence* in the sense that a poor country A will grow faster than rich country B, understanding that country A is poorer because it is further away from its own steady-state than country B is. In contrast, *absolute β-convergence* assumes that $y_i{}^*$is the same for country A and B, $y_i{}^* = y^*$. We cannot know exactly what the steady state output looks like, but we know it is related to structural characteristics such as technologies, preferences, propensity to save, institutions, policies, etc.

Empirically, one can estimate β-conditional convergence by finding proxies for the steady state[5] or by grouping economies that we assume have the same steady state (Sala-i-Martin, 1996). So, if we gather countries that have or we expect to have similar steady-states we are finding (or testing for) convergence in different groups, namely group convergence.

On the other hand, the multiple equilibria models starting with Azariadis and Drazen (1990) (and followed by many others, see Durlauf and Quah, 1999) advocate for multiple regime in which different economies obey different linear models when grouped according to different initial conditions. For example, there exists a range of human or physical capital levels over which the

[3] Durlauf and Quah (1999) offer a great summary of economic growth theories and empirics

[4] Basically, from a Cobb-Douglas production function for the economy, and a Utility function for a representative agent, the economy will eventually arrive to a steady state, where the economy cannot grow anymore. Equation (1) is the resulting equation after optimization and log-linearlization (see Barro and Sala-i-Martin (2004) for the derivations).

[5] However, the problem of adding controls as proxies for the steady-state, is that these will probably be endogenous (Durlaug and Quah, 1999).

aggregated production function is not concave which will lead to different long-run steady-states. In this way, initial conditions can "trap" countries into not reaching the rich countries.

Azariadis (1996) and Canova (2004) suggest that the potential causes of traps are several, like technologies, preferences, market structures, fertility patterns and public policies. These variables preserve and augment initial inequality in per capita income among otherwise identical national economies. This concept is called club convergence.

Unfortunately, economic theory does not guide us on the number of clubs or the way in which the different variables defining initial conditions interact in determining the clubs. To address this issue, most researchers (e.g. Durlauf and Johnson, 1995; Bai, 1997; Hansen, 2000; Pesaran, 2006; Paap van Dijk,1998; and Desdoigts, 1998) lean towards the approach of letting the data decide the clubs. They usually study the shape of the distribution of income per capita and focus on finding an income threshold to divide clubs; however they may not be able to explain the differences in income or capital in first place.

The difference between group convergence and club convergence lies on their assumption about stratification. Group convergence assumes the stratification is due to different steady states, while club convergence assumes that the stratification comes from interactions on initial conditions with different variables. Empirically, both can be estimated from Equation (1).

2.2 Prior research in Latin America

In Latin America, there are only nine cross-country empirical studies[6] on convergence (Blyde, 2005 and 2006; Holmes, 2005; Astorga, et.al 2005; Dobson and Ramlogan, 2002a and 2002b; Utrera, 1999; Dabus and Zinni, 2005; and Madariaga et.al,2003). Although they analyze the same region, they study different countries and periods, and apply different methodologies.

Some of the authors use methodologies that do not measure a specific speed of convergence, such as Blyde (2006), who studies 21 countries during 1960-2004 and uses a distribution dynamics approach. He finds that countries are converging to two clubs; one large for low and low-middle

[6] The number of studies within a given country is higher than across countries, and usually concentrated in few countries, such as Chile, Argentina, Brazil and Colombia (e.g. Marina (2001), Azzoni et al.(2001), Anriquez and Fuentes (2001), Cardenas and Ponton (1995), Magalhaes, Hewings and Azzoni (2005), Serra et al.(2006)).

income countries and another small for rich-income countries. The high-income countries are Uruguay, Argentina, Chile, and Mexico, and the remaining 17 countries are in the other club.

Dobson, Goddard and Ramoglan (2003) study the case of 24 countries during 1965-1998 by using cross-section analysis and unit root with panel data tests, and find convergence but not a specific speed nor different clubs. Other researchers find concrete results but no clubs. For example, 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, and find speeds of convergence of 0.02% to 2%[7]. Helliwell (1992) analyzes 18 Latin American countries over the period 1960-1985 and finds convergence at a speed of 2.5%[8].

The only other study that incorporates economic history features into their analysis is Astorga et al., 2005. They first do a time series analysis for each of their six countries of study, during 1900-2000, where they find different breaks for each of them. They conclude that there are two external shocks affecting the six economies simultaneously: in the 1930s due to the Great Depression and in 1980s due to the shift in US monetary policy and debt crises[9]. Later, they find convergence between the six 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[10]. They conclude, among other things, that there is convergence among the six countries but it seems there is divergence between the rest, forming two distinct convergence clubs (they do not test for this). They say that the "rest" show an inferior pattern of growth compared to the six, due to lower growth rate and greater vulnerability, which may possibly relate their greater vulnerability to the external shocks.

In stark contrast to these findings of relatively low speeds of convergence, Dabus and Zinni (2005) analyze 23 countries from 1960 to 1998, and find absolute and very high conditional convergence rates. The authors argue that once controls are introduced and extremely high speeds of

[7] Their studies include, as proxies for the steady state, sectorial decomposition variables, country dummies, population growth, savings, and human capital.
[8] He includes variables such as investments, population growth, human capital, and scale effects.
[9] However, from my point of view, the shift in US monetary policy and debt crises are consequences the exogenous shock of the increase in oil prices in 1974.
[10] They include human capital, external, institutional, and economic variables, together with dummy variables related to external events, such as the Great Depression and the Debt Crises. The countries are Argentina, Brazil, Chile, Colombia, Mexico, and Venezuela.

conditional convergence are found, compared to absolute convergence, then it is a signal of divergence. This is a good point, since when controlling for many characteristics, a hypothetical speed of convergence is being calculated, while the real speed of convergence would be the one closest to absolute convergence[11]. They conclude that convergence of any type is absent in Latin America.

2.3 Economic history of the region

To analyze the economic history of 32 countries during more than 100 years is a complicated task, and even more so when one wants to focus on the common factors of the region as a whole rather than country specific sets of events. Historians face this task, and one of the main references for my analysis in this section is Thorp (1998), who captures in depth the comparative reality within Latin America.

Below, I describe the common events and focus on two very important external shocks that have changed the development patterns in the region: the Great Depression of 1930 and the oil crisis in 1974. The first shock changed the political economy of the region, and as a result many of the countries underwent a process of import substitution industrialization. The second shock, too, changed the political economy of the region, resulting in a debt crisis, to which the response in many cases was to adopt structural reforms to liberalize the economies. Thus, the pattern changed from initially exporting, to substituting imports with the state playing an important role, and finally liberalizing and a lowering the role of the state.

1900-1930: The Exporting Phase

There is no doubt that during the first phase of the 20th century the economics of the region was characterized by being dependent on exports, which were primary products with low value added. The region was vulnerable to world income and to fluctuations in primary products prices.

The first phase is characterized by the world export demand being high and the capital flows being fluent to the region. These two facts determined the way Latin America developed. The

[11] In this regard, Durlauf and Quah (1999) mention that the choice of the steady-state proxies depends on the interest of the researcher and this can lead to wrong results.

region exported the needed primary products and at the same time imported more elaborated goods produced in the "center".

WWI (1914-1918) accelerated the shift in trade and investment structures in the region. The demand for Latin America's exports increased, and according to Furtado (1981) the war stimulated the industrial growth in the region, especially in the mineral countries. The economic pattern and the political economy did not change after WWI, but they did when the Great Depression hit the region.

1930: The Great Depression

In 1929 the US stock market crashed and provoked a fall in economic activity in the industrialized countries, which in turn reduced their demand for primary products and reversed the capital flows 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 of adjustment is a decrease in real export prices so that demand is stimulated again, but due to the extreme circumstances of the Great Depression, world demand could not recover. Instead, Latin American demand went from imported manufactured goods to domestic manufactured products. This process stimulated the import substitution phase of Latin America. Cardoso and Helwege (1992) call it "import substitution by default".

The process of industrialization via import substitution was reinforced by WWII (1939-1945). Although WWII brought an increase of Latin American exports, there were constraints on imports. Consequently, the scarcity of imports and the deterioration of terms of trade of primary products encouraged new efforts to substitute imports, but these efforts were in turn limited by scarcity of imported inputs and capital goods. National governments promoted industries and restricted imports, mainly by lowering interest rates, giving easy credits, and controlling prices. Capital inflows were attracted through loans to the public sector. Moreover, governments applied multiple exchange rates, protective tariffs, import licenses, and different import quotas that could favor the essential goods imports and reduce final goods imports.

As a result of the protection of the national markets, the exporting sectors in many countries in Latin America were discouraged due to high cost of domestic intermediate products, and the restriction on imports demand overvalued the exchange rates, making prices less competitive.

Moreover, fiscal revenues from the commodity product sector went down and public spending rose, creating a fiscal gap, which in some cases was monetized and later created persistent inflation. The result was detrimental for sectors that were not intensive in capital, like the agricultural sectors and the artisans. Finally, the low interest rates given by the government to promote investments discouraged saving even when helping inefficient firms and corruption increased greatly. However, for those countries where industrialization was strong, innovations were made in terms of organization, technology and R&D (together with investment in education), like in Brazil, Argentina and Mexico. Another positive side was that some enterprises were ready to export. Overall, more manufactured goods were produced.

1974: Oil Price Shock

Later, in 1974, the shock of the increase in oil prices led Latin America to become highly indebted, which led to a debt crises in the region. The mechanism is described by Cardoso & 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.." .

The debt crises started in 1979 and 1981 when the Unites States and other OECD countries kept their money supply tight and increased interest rates radically. Since countries acquired loans at floating interest rates, their debt obligations increased very much[12]. The adjustment of the debt crises was costly for all countries in the region, mainly due to the massive capital outflow. Governments were not able to continue their policies and had to make drastic changes. In general, governments printed more money to cover or keep their fiscal deficits constant. With all the borrowed money, governments were used to spending more than their incomes. Since printing money can cause inflation pressures and damage real wages, some governments indexed the nominal wages to prices to keep real wages constant. Speculators, trying to earn from the indexation, raised prices at higher rates than salaries. Sooner or later inflation exploded into hyperinflation and governments were no longer able to manage it.

[12] The average real interest rate on LDC debt rose from -6% in 1981 to 14.6% in 1982 (Thorp, 1998).

Countries were desperate to stabilize and gain access to foreign credit again, and the "Washington Consensus policy package" was an option to reach stabilization. The package was a set of structural reforms to liberalize the economy. The specific policies were to cut budget deficits (by reducing expenses and increasing taxes), privatize, liberalize imports, impose exchange controls (devaluate), eliminate price controls (to reflect the real costs), and increase interest rates (Cardoso & Helwege, 1992). Some countries took the package as such, and others took some elements of it. However, in general the adjustment left behind common problems that reinforced each other, such as capital outflows, fiscal deficits, inflation, overvaluation, and balance of payment crises.

Later, in the 90's, some trends of thought support the idea that good institutions create complementarities between productivity growth and equality. Others maintain that policies that are linked to the political constituency will create a combination of economic and social development. When the population participates in the process of making decisions, the feeling of ownership helps to monitor and accomplish their obligations better. Thorp calls these new currents "the New Paradigm Shift", which started by the mid 1990s, as a response to the poor welfare results. Thorp points out that the rise of the paradigm shift is a result of the increasing capital flows, the debt crises, and the costly adjustment process. However, it is hard to attribute the results to either globalization or policy shifts alone.

3 Empirical Specification

The previous section described how the political economy changed from initially exporting, to substituting imports with a great role played by the state, and finally to liberalizing and a diminishing the role of the state. These changes are clearly radical, and according to multiple equilibria models, each historical watershed is an opportunity to modify the set of initial conditions and to escape from a development trap and according to Solow-Swan model, each political change will result in different steady-states.

I focus on a criterion to divide countries into clubs that describe the initial conditions after the shocks, as under the multiple-equilibria models. The criterion is based on the policies adopted at the beginning of each phase, as a response to the shock. I focus on information of policies rather than of

outcomes so the results are not driven by the selection of the club thresholds in the first place[13]. I explain first the club division and later the econometric specification.

3.1 Division of Clubs

Mineral and Agricultural Clubs: 1900-1930

For the first phase, the initial conditions are defined in terms of type of natural resource endowment. Due to lack of data in this phase, I divide countries into groups according to mineral vs. agricultural countries, rather than a more extensive type of division by product.

Agricultural countries' production was vulnerable to natural disasters, and minerals were vulnerable to recessions in the "center", because minerals were used in construction, machinery, and chemicals production. Moreover, the two types of production had different spillovers. For instance, the mining sector was characterized by using less land and labor with more capital and technological intensity, and having different transport needs than the agricultural sector. Acemoglu et.al (2001) also points out that the mining countries set more extractive institutions.

The agricultural countries are: Brazil, Colombia, El Salvador, Nicaragua, Costa Rica, Guatemala, Honduras, Ecuador, Cuba, Argentina, and Uruguay. They were mainly producing coffee, bananas, cacao, sugar, meat, and/or wheat. Those mainly producing coffee were Brazil, Colombia[14], El Salvador and Nicaragua. Costa Rica and Guatemala were mainly producing coffee and bananas, while Honduras was producing bananas and precious metals. Cuba mainly produced sugar, but also tobacco. Argentina and Uruguay were mainly producing meat and wheat.

The mineral countries numbered 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[15]. Mexico was the most

[13] In Barrientos (2010), I actually analyzed different clubs in the region based on the outcomes rather than the policies.
[14] Colombia also exported gold (Antioquia region) besides coffee but I keep it in the agricultural group because coffee has been more traditional.
[15] It is debatable whether Venezuela is among the mineral countries, since its oil was discovered more in the middle than at the beginning of the phase. Still, I decided to keep it in the mineral club, because since its oil discovery, Venezuela has been dependent on its petroleum.

diversified export country in Latin America, also exporting lead, zinc, silver, gold, coffee, rubber, and cotton. It discovered its oil in 1910.

Reactive and Passive Clubs : 1931-1974

After the onset of the Great Depression in 1930, countries responded in different ways. Díaz (1984) divides countries into reactive and passive. The reactive countries had policy autonomy in the sense that they could, for example, depreciate their exchange rate and thereby speed up the relative price adjustment to recover faster, while the passive countries had to stay tied to the dollar. Also monetary and fiscal policies were employed. Some countries were not included in Díaz (1984), so I use Taylor (1999) to complete the clubs. Those countries that did some sort of exchange rate control and market activity control were included in the reactive club[16].

Díaz (1984) classified as reactive countries: Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Uruguay. I added to this group six countries that were not mentioned by Diaz (1984) but by Taylor (1999): Bolivia, Costa Rica, Nicaragua, Paraguay, and Venezuela. According to Table 3 in Taylor (1999), these countries exerted some sort of exchange rate control and/or some sort of control of capital market activity.

Diaz (1984) has the following passive countries: Cuba, Dominican Republic, Honduras, Haiti, Panama, and Puerto Rico. I added Ecuador, Guatemala, and El Salvador, following Taylor (1999).

Low and High Reformers Clubs: 1975-2007

After the oil prices shock in 1974, countries went into debt crises, and the policy decision was whether to follow the structural reforms proposed by the Washington consensus or not. The change in policies was very radical in the region. Many countries went from protection of national markets and great control by the state to policies that facilitate the operation of markets and reduction of the distorting effects of state intervention in economic activities. Lora (2012) develops an index that tries to capture how deep the reforms went (rather than outcomes). The higher the index, the more market friendly the reforms. The index summarizes the status of progress in policies within trade, financial, tax, privatization, and labor areas. By using the Lora index, I classify countries into two

[16] During the second phase, a natural way of dividing clubs seems to be according to whether countries were industrialized or not. However, this approach would divide clubs by result more than policy, and would not reflect the initial condition for the phase, so I rule out this possibility.

groups: the high reformers, whose indices are above the average, and the low reformers, whose indices are below average[17].

According to the Lora index the high-reformers are: Argentina, Bolivia, Chile, Panama, Paraguay, and Uruguay. I added to this group Panama and Puerto Rico, given that both have close relations with USA who promoted the Washington Consensus package.

According to Lora's index, the low-reformers are: Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Peru, and El Salvador. I added Cuba for obvious reasons.

Caribbean Club

Finally, the Caribbean countries are treated as one club, due to its own characteristics. They are small, dependent on USA, and are characterized by their vulnerability to capital flight and international interest rate changes. They are quite open[18] and primary products producers. Additionally, Caribbean countries are exposed to natural disasters. I include the Caribbean club in each phase except the first due to lack of data.

The Caribbean group consists of many islands and English speaking countries, mainly part of the trade union CARICOM: The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Saint Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, and Trinidad and Tobago.

3.2 Econometric Specification

The model setup follows Barro and Sala-i-Martin (2004), where the main interest is in measuring the non-linear relation between initial output and growth. Although the setup is developed for neoclassical growth models, it is used when measuring club convergence as well.

I start from the *absolute convergence* definition:

$$\gamma_{it} = a - \frac{1-e^{-\beta\tau_t}}{\tau_t} \cdot y_{0_{it}} + u_{it} \qquad (2)$$

[17] The Lora index of structural reforms is taken from the year 1985, while phase 3 starts in 1974. I considered starting the last phase in 1985, but then I would be inconsistent with the previous phase, where the break was determined by an external shock. One could argue that the increase in US interest rates in 1979 was the external shock, but this in turn was a response to the oil price shock earlier. Also from 1974 to 1979 the results should not change significantly.

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

where subscript i refers to countries, i=1,...N and t refers to periods, t=1,...T. Each period has a length of τ_t, which is determined by the availability of data[19], γ_{it} is the growth rate of GDP per capita over the period, $y_{0_{it}}$ is the initial output per capita (measured in logarithms), a is a constant[20], β is the speed of convergence if β>0 (or divergence if β<0), and u_{it} is the disturbance term.

Equation (2) tells us that if β is positive, the relation between initial income and growth is negative, so that the poorer the country is at the beginning, the faster the growth rate, which implies that the differences at the beginning of the phase tend to disappear.

Galor (1996) mentions that by adding empirically significant elements to the neoclassical growth model, one can analyze club convergence under the same framework, he suggests inequality measures as an example. So, in order to control more adequately for the initial differences, I add two more variables at the beginning of each period: size and ranking of each country. Size could give a certain advantage in the growth process, since size is associated with economic power. In a similar fashion, position in the distribution of income captures the relative ranking at the beginning of the period:

$$\gamma_{it} = a - \frac{1 - e^{-\beta_{\tau_t}}}{\tau_t} \cdot y_{0_{it}} + \sum_{k=1}^{2} b_k \cdot x_{k0_{it}} + u_{it} \tag{3}$$

where $x_{10_{it}}$ is the size of a country measured by the logarithm of population and $x_{20_{it}}$ is the ranking measured by the relation of each country's output per capita to the highest output of the same year.

Now, I introduce the two main external shocks discussed earlier:

$$\gamma_{it} = a - \frac{1-e^{-\beta\tau_t}}{\tau_t} \cdot y_{0_{it}} + \sum_{k=1}^{2} b_k \cdot x_{k0_{it}} + \sum_{p=1}^{2} c_p \cdot D_{p_{it}} + u_{it} \tag{4}$$

[19] Details on τ are in the appendix.

[20] The constant a is capturing the common effects for being in the same region as language, culture, religion, etc., and the common steady-state. I could have included a dummy for each country, as it is usually done in panel data studies, in order to include somehow each of their steady-states but that would lose the essence of the idea of the paper, which is that inside each club , we expect convergence to occur. Moreover, after including country-specific characteristics, we would probably find higher rates of convergence, which would be artificial (more on this in the discussion section).

where D_1 is a dummy for the first phase 1900-1930, D_2 for 1931-1974, and D_3 for1975-2007.

The next step is to introduce a dummy for each club. I create dummies where I combine phase and club characteristics. I replace the phase dummies with club dummies:

$$\gamma_{it} = -\frac{1-e^{-\beta\tau_t}}{\tau_t} \cdot y_{0_{it}} + \sum_{k=1}^{2} b_k \cdot x_{k0_{it}} + \sum_{c=1}^{8} d_c \cdot G_{c_{it}} + u_{it} \quad (5)$$

where $G_{c_{it}}$ is the club dummy. In total we have eight dummies (c=1,...8) that represent the clubs mentioned in the previous section. In Phase 1 we have the agricultural and mineral clubs, in phase 2 reactive and passive clubs, and in phase 3, high-market friendly and low-market friendly countries. Moreover, we have the Caribbean countries as a club and included for phases 2 and 3.

Equations (2) to (5) describe general aspects for the region as a whole. Only one common β coefficient is included. So, after controlling for the different dummy characteristics, we get one beta for the entire region. Additionally, we can see the significance of each club in the overall growth and compare their contribution.

Next, I focus on finding different β coefficients, one for each club. I first calculate a similar version of Equations (2) and (3) with a different β for each group:

$$\gamma_{it} = a - \frac{1-e^{-\sum_{c=1}^{8}\beta_c \cdot G_{c_{it}} \cdot \tau_t}}{\tau_t} \cdot y_{0_{it}} + u_{it} \quad (6)$$

$$\gamma_{it} = a - \frac{1-e^{-\sum_{c=1}^{8}\beta_c \cdot G_{c_{it}} \cdot \tau_t}}{\tau_t} \cdot y_{0_{it}} + \sum_{k=1}^{2} b_k \cdot x_{k0_{it}} + u_{it} \quad (7)$$

and then adding the phase dummies to Equations (6) and (7):

$$\gamma_{it} = -\frac{1-e^{-\sum_{c=1}^{8}\beta_c \cdot G_{c_{it}} \cdot \tau_t}}{\tau_t} \cdot y_{0_{it}} + \sum_{p=1}^{3} c_p \cdot D_{p_{it}} + u_{it} \quad (8)$$

$$\gamma_{it} = -\frac{1-e^{-\sum_{c=1}^{8}\beta_c \cdot G_{c_{it}} \cdot \tau_t}}{\tau_t} \cdot y_{0_{it}} + \sum_{k=1}^{2} b_k \cdot x_{k0_{it}} + \sum_{p=1}^{3} c_p \cdot D_{p_{it}} + u_{it} \quad (9)$$

Since it is a costly model in terms of parameter estimation, I restrict the parameters b_k to be equal across clubs. I also restrict the model to have only three (phase specific) constants instead of eight different (club) constants. Moreover, the interest lies in the initial income coefficients, and here the club effect is allowed. I prefer not to do a separate regression for each club since the panel data sample for each club becomes too small.

4 Results

The econometric tool employed is non-linear pooled OLS regressions for 32 countries for the period 1900 to 2007. The data description is in the Appendix. I report the coefficients, heteroskedasticity consistent standard errors (White, 1980) and other descriptive estimates, from Equations 2-5 in Table 1 and from Equations 6-9 in Table 2.

From Table 1 we can see that the initial income coefficient, β, has almost the same rate in Equation 2 as in Equation 3: around 0.15%. However, in both cases we fail to reject the null hypothesis that the β coefficient is zero (no convergence). When adding size and position, Equation 2, the coefficient of the variable size is significant and negative, while the coefficient for the variable position is positive but insignificant.

Equation 4 shows that each of the phase dummies is significantly different from the last phase (the omitted dummy). I also test whether both phase dummies are jointly significant in the equation (H_0: c_1=c_2=0). The test statistic is F=3.25, and we reject the null (at a level of 95% of confidence). The β coefficient is -0.65%, showing overall divergence. The coefficient of size remains negative, while position has changed to negative. Both variables are significant.

Equation 5 substitutes the phase dummies for the club dummies, since the last ones include the first ones. Results are in the last column of Table 1. Regarding β, there is a significant negative coefficient, supporting divergence among all Latin American countries. This means that the relation between initial income and growth is positive once we take into account the effect of the different

clubs and initial conditions. All coefficients of club dummies are significant, except for the mineral countries. This is clear evidence that the club division is successful. The coefficients of all dummies are negative, which is just showing the differences in the constant term of the growth equation according to the clubs. Size and position retain negative signs.

So far, I have shown that the division of phases and clubs is very important, and that there is significant divergence among all countries, after controlling for differences in initial conditions and membership in different clubs.

The next task is to see whether contrary to the overall divergence picture there is in fact convergence inside each club. We proceed to calculate β convergence for each group. Table 2 shows the results from estimations of Equations 6 to 9.

Equation 6 is a similar version to Equation 2, in the sense that no controls are included. The results are presented Table 2. The βs for all clubs are significant and positive. This supports again the basic idea behind the paper, that there is club convergence, and the coefficients are significant. The positive sign of β means that there is a non-linear negative relation between initial income and growth. All coefficients are low and similar to each other, so I test whether the club dummy coefficients are significantly different from each other, and whether they are jointly significant. The F test is 3.54 for the first test indicates that we can reject the null with 95% confidence, and similarly, F=3.48 for the second test, which means that the dummies are jointly significant and different from each other. To control for more initial conditions, Equation 7 is estimated. The results in column 2 show that the βs remain similar, all positive and significant. I do the same tests as for Equation 5, and the results show that all βs are jointly significant and significantly different from each other. The coefficient for size is still negative and for position positive, but both insignificant.

In general, the results show that the division by historical phases and clubs is important. When the club dummies were introduced in the specification, where it was assumed that β was common in the clubs, in Column 4 Table 1, the club dummies were significant, so that their inclusion was correct, and the β coefficient that relates initial income to growth was negative, which means divergence among all countries (confirming the impression in Figure 1). After allowing for heterogeneity in the non-linear relation between growth and initial income, in Table 2, there is enough evidence that the clubs show convergence. The βs for all clubs are significant and positive

as expected (Columns 1 and 2 in Table 2). When adding more controls, two of them become insignificant, the Caribbean and the high-reformers (Columns 3 and 4 in Table 2) in the last phase. The two variables besides income, used to control for differences in the initial conditions, size in terms of population, and position in the income distribution, show a negative relation with growth when significant (Columns 2 to 4 in Table 1). The rates of speeds of convergence are all around 0.5% which is lower than the typical 2% found in the literature. The reason for this difference may lie in that I do not have as many controls for the steady state.

Variable	Equation 2	Equation 3	Equation 4	Equation 5
Initial GDP	0.001	0.001	-0.006+	-0.007***
	[0.003]	[0.003]	[0.005]	[0.003]
Size		-0.002**	-0.002**	0.000
		[0.001]	[0.001]	[0.001]
Position		0.003	-0.014*	-0.020***
		[0.006]	[0.008]	[0.006]
Phase 1			0.012**	
			[0.006]	
Phase 2			0.010**	
			[0.004]	
Agricultural				-0.024***
				[0.008]
Mineral				-0.019+
				[0.014]
Caribbean 2				-0.011**
				[0.006]
Reactive				-0.024***
				[0.007]
Pasive				-0.027***
				[0.006]
Caribbean 3				-0.029***
				[0.010]
Low-reformers				-0.042***
				[0.008]
High-reformers				-0.031***
				[0.008]
Constant	0.027	0.054*	-0.003	
	[0.021]	[0.029]	[0.042]	
N	257	257	257	257
rss	0.118	0.116	0.113	0.108
R2	0.002	0.020	0.047	0.419

Table 1. Common β. Econometric results from estimations of Equations 2 to 5. Standard errors in brackets, *** significant with p<0.01, ** p<0.05, *p<0.10, ++p<0.15 and +p<0.20. Phase 3 is omitted

Variable	Equation 6	Equation 7	Equation 8	Equation 9
Initial GDP				
Mineral	0.004*	0.004*	0.000	-0.001
	[0.002]	[0.002]	[0.006]	[0.007]
Agricultural	0.004***	0.004***	0.001	0.000
	[0.001]	[0.001]	[0.006]	[0.008]
Caribbean 2	0.002*	0.002*	0.002**	0.002**
	[0.001]	[0.001]	[0.001]	[0.001]
Reactive	0.004***	0.004***	0.005***	0.004***
	[0.001]	[0.001]	[0.001]	[0.001]
Pasive	0.004***	0.004***	0.005***	0.005***
	[0.001]	[0.001]	[0.001]	[0.001]
Caribbean 3	0.003***	0.004**	0.001	0.000
	[0.001]	0.002	0.004	0.005
Low-reformer	0.005***	0.005***	0.003	0.001
	[0.001]	[0.001]	0.004	0.006
High-reforme	0.003***	0.004***	0.001	0.000
	[0.001]	[0.001]	0.004	0.005
Size		-0.001		-0.001
		0.002		0.002
Position		0.003		-0.002
		0.006		0.007
First Phase			0.021	0.029
			0.041	0.064
Second Phase			0.055***	0.064**
			0.010	0.029
Third Phase			0.027	0.028
			0.036	0.045
Constant	0.046***	0.056**		
	0.009	0.028		
N	257	257	257	257
rss	0.109	0.109	0.109	0.109
R2	0.076	0.078	0.415	0.416

Table 2. Different β rates. Econometric results of estimations of Equations 6 to 9. Same description as Table 1.

5 Strengths and Weaknesses of Approach

Even though the results are quite satisfactory, there are caveats regarding the approach that need to be discussed. In this section I discuss the flaws of the current division of clubs, other possible ways of finding clubs, omitted variables, unbalanced panel data, and measurement errors.

5.1 Division of Clubs

The most controversial characteristic of this paper is the division of clubs. There could have been superior alternative ways to approach the division.

Ideally, I could have determined structural breaks for the given time period of data for all 32 countries. One way of doing this is following Bai (1997), who develops a method for finding multiple breaks. Another option is to analyze breaks for each country and see if there were common breaks. Astorga et al. (2005) do this for six countries over 100 years, using the Chow test. Table 1 in their paper shows the different structural breaks by country. These shocks account for external and internal events, like revolutions, dictatorships, and country specific characteristics. At the end, the authors do a panel data analysis where they recognize that the major events for all countries were the crisis of 1929 and its aftermath in 1930, along with the debt crises in the 1980s. Instead, I let historians decide the breaks, and, after all, the breaks are similar to the ones in Astorga et al. (2005). Moreover, the significance statistical tests on the phase dummies prove that the breaks are relevant.

Similarly, regarding the clubs, I could have chosen many other ways of dividing countries into clubs. Canova (2004) argues that the initial distribution of income per capita, the initial level of human capital, and human capital within the country could be used as economic causes of heterogeneity. In addition, he says, geography/location can be used to measure the neighborhood externalities, and policy variables could measure national effects.

Given that the data are limited, I am not able to use more variables than the ones I have already used. I could have had more variables but for fewer countries, which would change the essence of the paper. I did try to group countries according to geography: Caribbean, Central and South American clubs. The results showed divergence. I also tried to divide the countries according to economic integration and had no success (in Barrientos, 2010) because integration in Latin America is not yet well developed. This is not enough evidence to claim superiority over other ways of

dividing countries into clubs, but it is appealing to have another way of diving into clubs than those already known.

It is worth noting that the division of clubs by economic history has flaws. The clubs in the paper are presented as independent from each other. However, clubs in each phase depend on clubs in previous phases. Many countries may not be able to make a "fresh start" at every historical juncture. Moreover, the division of phase one, which is by resources, is still very important in later phases, as noted by Acemoglu et.al (2001) and Engerman and Sokoloff (2002).

5.2 Omitted Variables

This paper studies more countries and years than any other study. However, this imposes restrictions in terms of the possibility of adding more variables. I could have restricted the analysis into fewer countries, fewer years, and more variables. However, the essence of this paper is the inclusion of as many countries and as many years as possible to analyze historical events and use these events in a way that maybe variables would inform. Still missing variables is a problem in this approach, which means that the results may be biased and inconsistent.

Nevertheless, as mentioned before, including proxies for the steady state introduce endogeneity problems and the results can be hard to interpret in the sense that the inclusion of more controls, will tell us less about the true convergence. β convergence tells us about poor countries growing faster than rich ones, conditional on the controls. So intuitively, when adding controls, we will most likely find high rates of convergence but these will probably be artificial.

5.3 Unbalanced Panel and Measurement error

The data is an unbalanced panel, where 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 here is connected to the regressor (initial output per capita), having unbalanced panel data is not a problem.

Another concern is the temporal measurement error that can lead to inflated convergence rates. Barro and Sala-i-Martin (1992) show in their appendix that measurement error is unlikely to be important, results seem to be similar. Here I use the same setting as in their article with the

difference that I use more homogenous countries. So I rely in their results and arguments for not worrying for measurement errors, as they do.

6 Conclusions

This article investigates and connects the economic history of Latin America, reflected into the analysis of external shocks, trends and ideologies, as sources of heterogeneity in the growth process and club formation in Latin America. First, I identify two main common external shocks to the region: the Great Depression in the 1930s and the oil price shock in 1974. Then I classify countries in clubs according to their policy-response to the shocks. I focus on a criterion to divide countries into clubs that describe the initial conditions after the shocks. The criterion is based on the policies adopted at the beginning of each phase, as a response to the shock. I focus on information on policies rather than outcomes so the results are not driven by the selection of the club thresholds in the first place.

Before 1930, I define two clubs: the minerals and agricultural. After the Great Depression I follow Diaz (1984) classification of clubs according to passive or reactive, where the reactive responded autonomously to protect themselves, while the passive did/could not. After the oil price shock, I classify the clubs according to the Lora index, which describes how far countries applied structural reforms to liberalize their economies. I also include the Caribbean countries as a separate club.

In general, the results show that the division of phases and clubs is important. When the club dummies were introduced in the specification with a common β coefficient, Column 4 in Table 1, the club dummies were significant, so that their inclusion was correct, and the β coefficient that relates initial income to growth was negative, which means divergence among all countries (confirming the impression from Figure 1). When allowing for heterogeneity in the β coefficients, there is evidence that the clubs show convergence. The βs for all clubs are significant and positive as expected (Columns 1 and 2 in Table 2). When adding more controls, two of the club βs become insignificant, the Caribbean and the high-reformers (Columns 4 and 5 in Table 2), in the last phase, but the overall impression is still one of club convergence, and the βs are jointly significant.

Regarding policy implications, I find that the clubs to which countries appertain, are determined by policy makers but also by external shocks and natural resources endowments. I cannot conclude that one club is superior than another, because successful countries belong to different clubs. Therefore, I cannot suggest how to jump to a superior club, as is suggested in a traditional approach, where clubs are defined by income or capital thresholds which imply that a significant transfer of money would help a country jump to a superior club.

Appendix

Data

The analysis covers 32 countries, listed in Table 3, 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.

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 commodity prices. The sources are the Madison database (2003) and the World Bank (2004). The final data base has information from the Madison database (M) (from 1900 until 1989) and from the World Bank database (W) (from 1990 to 2007).

A converter factor (C) is calculated as: $C_{(1990)}=M_{(1990)}/W_{(1990)}$ for each year and is kept constant from 1995. Then C is multiplied by the existent W. In the case of ten small Caribbean countries, M has no data, so C is taken constant, for the year 1995, from another country that heavily influenced these economies and is assumed to have a similar C. The one 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. In the case of Cuba, the available GDP from W was measured in constant 2000 local currency. Here, C was calculated with that kind of data and kept constant for the year 2001. The transformed data go from 2001 to 2007.

The panel data were created by taking averages or the values of variables in subperiods of different lenght. The choice for different lengths is to take advantage of the data and coincide with the phase 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 3. Description of observations in data set.

countries1		ly	lppl	pos
arg	mean	8.57	16.64	0.78
	sd	0.36	0.60	0.20
	max	9.27	17.49	1.00
	min	7.91	15.36	0.47
	obs	108	108	108
bhs	mean	9.43	12.30	0.96
	sd	0.13	0.30	0.06
	max	9.54	12.72	1.00
	min	9.05	11.66	0.80
	obs	28	47	28
blz	mean	8.08	12.02	0.24
	sd	0.32	0.34	0.05
	max	8.57	12.65	0.33
	min	7.64	11.45	0.17
	obs	33	47	33
bol	mean	7.67	15.07	0.20
	sd	0.17	0.51	0.04
	max	7.96	16.07	0.33
	min	7.36	14.34	0.14
	obs	63	108	63
bra	mean	7.61	17.92	0.30
	sd	0.74	0.74	0.07
	max	8.76	19.06	0.43
	min	6.52	16.70	0.20
	obs	108	108	108
brb	mean	9.13	12.42	0.73
	sd	0.12	0.03	0.05
	max	9.33	12.47	0.81
	min	8.90	12.35	0.63
	obs	25	47	25
chl	mean	8.32	15.74	0.60
	sd	0.49	0.54	0.13
	max	9.48	16.63	1.00
	min	7.58	14.91	0.37
	obs	108	108	108
col	mean	7.77	16.43	0.34
	sd	0.57	0.74	0.05
	max	8.79	17.61	0.46
	min	6.88	15.20	0.24
	obs	108	108	108
cri	mean	8.01	13.88	0.37
	sd	0.50	0.87	0.06
	max	8.89	15.31	0.47
	min	7.26	12.60	0.24
	obs	88	108	88
cub	mean	7.63	15.54	0.24
	sd	0.26	0.59	0.07
	max	8.02	16.23	0.43
	min	6.88	14.32	0.15
	obs	76	108	76
dma	mean	7.55	11.16	0.14
	sd	0.29	0.05	0.03
	max	7.90	11.22	0.19
	min	6.93	11.02	0.08
	obs	31	47	31

countries1		ly	lppl	pos
hnd	mean	7.33	14.39	0.20
	sd	0.20	0.82	0.08
	max	7.62	15.79	0.42
	min	6.91	13.12	0.10
	obs	88	108	88
hti	mean	6.88	15.11	0.09
	sd	0.15	0.54	0.03
	max	7.17	16.09	0.20
	min	6.61	14.26	0.04
	obs	63	108	63
jam	mean	7.94	14.18	0.27
	sd	0.41	0.43	0.05
	max	8.33	14.80	0.39
	min	6.41	13.49	0.16
	obs	64	108	64
kna	mean	8.13	10.70	0.26
	sd	0.47	0.06	0.09
	max	8.74	10.83	0.39
	min	7.33	10.60	0.14
	obs	31	47	31
lca	mean	7.62	11.72	0.15
	sd	0.30	0.20	0.04
	max	7.92	12.03	0.20
	min	7.03	11.38	0.10
	obs	28	47	28
mex	mean	8.02	17.33	0.44
	sd	0.57	0.71	0.07
	max	8.94	18.47	0.64
	min	7.21	16.43	0.29
	obs	108	108	108
nic	mean	7.45	14.19	0.23
	sd	0.30	0.83	0.09
	max	8.12	15.54	0.40
	min	6.91	13.08	0.07
	obs	88	108	88
pan	mean	8.25	13.79	0.35
	sd	0.42	0.77	0.07
	max	9.01	15.02	0.45
	min	7.52	12.48	0.23
	obs	63	108	63
per	mean	7.70	16.06	0.32
	sd	0.55	0.66	0.06
	max	8.49	17.17	0.47
	min	6.71	15.15	0.21
	obs	108	108	108
pri	mean	8.76	14.58	0.62
	sd	0.57	0.43	0.23
	max	9.66	15.19	1.00
	min	7.67	13.77	0.29
	obs	52	108	52
pry	mean	7.72	14.30	0.23
	sd	0.31	0.79	0.07
	max	8.16	15.63	0.44
	min	7.31	12.99	0.15
	obs	69	108	69

countries1		ly	lppl	pos
dom	mean	7.63	14.74	0.18
	sd	0.41	0.92	0.04
	max	8.40	16.10	0.27
	min	6.93	13.15	0.13
	obs	58	108	58
ecu	mean	7.97	15.19	0.28
	sd	0.40	0.75	0.04
	max	8.50	16.41	0.36
	min	7.17	14.15	0.21
	obs	69	108	69
grd	mean	8.02	11.48	0.22
	sd	0.28	0.04	0.05
	max	8.35	11.54	0.30
	min	7.50	11.39	0.14
	obs	28	47	28
gtm	mean	7.81	15.09	0.31
	sd	0.31	0.75	0.11
	max	8.22	16.41	0.66
	min	7.15	14.08	0.18
	obs	88	108	88
guy	mean	8.04	13.50	0.23
	sd	0.11	0.07	0.03
	max	8.23	13.57	0.28
	min	7.84	13.28	0.18
	obs	33	47	33

countries1		ly	lppl	pos
slv	mean	7.44	14.67	0.21
	sd	0.39	0.67	0.04
	max	7.99	15.62	0.30
	min	6.71	13.55	0.14
	obs	88	108	88
tto	mean	9.08	13.40	0.78
	sd	0.41	0.53	0.16
	max	9.95	14.10	1.00
	min	8.21	12.50	0.46
	obs	58	108	58
ury	mean	8.40	14.56	0.66
	sd	0.37	0.39	0.17
	max	9.14	15.02	1.00
	min	7.70	13.73	0.40
	obs	108	108	108
vct	mean	7.52	11.51	0.14
	sd	0.33	0.09	0.03
	max	8.06	11.60	0.18
	min	6.85	11.32	0.09
	obs	33	47	33
ven	mean	8.40	15.75	0.70
	sd	0.93	0.81	0.28
	max	9.33	17.13	1.00
	min	6.68	14.75	0.23
	obs	108	108	108
Total	mean	7.96	14.68	0.38
	sd	0.67	1.70	0.24
	max	9.95	19.06	1.00
	min	6.41	10.60	0.04
	obs	2209	2907	2209

Table 4. Description of observations in data set by country, where ly is the logarithm of GDP per capita, lppl is the logarithm of population and pos is the position of country with respect to the richest country.

Mineral countries1		ly	lppl	pos
chl	mean	7.80	15.09	0.70
	sd	0.15	0.12	0.08
	max	8.13	15.29	1.00
	min	7.58	14.91	0.59
	obs	31	31	31
mex	mean	7.44	16.53	0.49
	sd	0.10	0.06	0.05
	max	7.60	16.66	0.64
	min	7.21	16.43	0.38
	obs	31	31	31
per	mean	6.98	15.31	0.31
	sd	0.19	0.10	0.05
	max	7.39	15.50	0.43
	min	6.71	15.15	0.25
	obs	31	31	31
ven	mean	7.09	14.88	0.37
	sd	0.46	0.07	0.17
	max	8.14	15.01	0.80
	min	6.68	14.75	0.23
	obs	31	31	31
slv	mean	6.89	13.87	0.25
	sd	0.06	0.19	0.01
	max	6.97	14.18	0.27
	min	6.82	13.55	0.22
	obs	11	31	11
ury	mean	7.99	14.03	0.84
	sd	0.17	0.20	0.07
	max	8.37	14.35	1.00
	min	7.70	13.73	0.67
	obs	31	31	31

Agricultural countries1		ly	lppl	pos
arg	mean	8.17	15.86	1.00
	sd	0.13	0.28	0.01
	max	8.38	16.29	1.00
	min	7.91	15.36	0.95
	obs	31	31	31
bra	mean	6.75	17.02	0.24
	sd	0.16	0.19	0.03
	max	7.05	17.33	0.30
	min	6.52	16.70	0.20
	obs	31	31	31
col	mean	7.09	15.53	0.34
	sd	0.11	0.21	0.03
	max	7.32	15.88	0.46
	min	6.88	15.20	0.30
	obs	31	31	31
cri	mean	7.40	12.88	0.42
	sd	0.05	0.15	0.04
	max	7.50	13.12	0.47
	min	7.33	12.60	0.36
	obs	11	31	11
cub	mean	7.36	14.76	0.36
	sd	0.06	0.26	0.02
	max	7.40	15.16	0.38
	min	7.32	14.32	0.35
	obs	2	31	2
gtm	mean	7.30	14.23	0.38
	sd	0.10	0.09	0.02
	max	7.48	14.39	0.41
	min	7.15	14.08	0.36
	obs	11	31	11
hnd	mean	7.20	13.43	0.34
	sd	0.10	0.19	0.03
	max	7.35	13.76	0.37
	min	7.04	13.12	0.28
	obs	11	31	11
nic	mean	7.22	13.28	0.35
	sd	0.12	0.11	0.03
	max	7.47	13.43	0.40
	min	7.08	13.08	0.30
	obs	11	31	11

Table 5. Clubs in phase 1. ly is the logarithm of GDP per capita, lppl is the logarithm of population and pos is the position of country with respect to the richest country.

Reactive countries1		ly	lppl	pos
arg	mean	8.55	16.70	0.77
	sd	0.23	0.23	0.17
	max	9.03	17.06	1.00
	min	8.17	16.31	0.52
	obs	44	44	44
bol	mean	7.53	14.96	0.21
	sd	0.12	0.19	0.04
	max	7.79	15.35	0.33
	min	7.36	14.70	0.16
	obs	30	44	30
bra	mean	7.51	17.89	0.27
	sd	0.38	0.35	0.04
	max	8.31	18.48	0.39
	min	6.91	17.35	0.20
	obs	44	44	44
chl	mean	8.27	15.70	0.58
	sd	0.22	0.26	0.13
	max	8.64	16.14	0.81
	min	7.73	15.30	0.42
	obs	44	44	44
col	mean	7.71	16.38	0.33
	sd	0.23	0.34	0.07
	max	8.19	16.97	0.46
	min	7.28	15.90	0.24
	obs	44	44	44
cri	mean	7.75	13.78	0.34
	sd	0.33	0.45	0.07
	max	8.40	14.51	0.46
	min	7.26	13.14	0.24
	obs	44	44	44
mex	mean	7.87	17.23	0.38
	sd	0.35	0.37	0.06
	max	8.52	17.87	0.49
	min	7.22	16.68	0.29
	obs	44	44	44
nic	mean	7.51	14.05	0.27
	sd	0.33	0.45	0.05
	max	8.08	14.81	0.40
	min	6.91	13.44	0.20
	obs	44	44	44
per	mean	7.81	15.95	0.36
	sd	0.34	0.30	0.06
	max	8.34	16.51	0.47
	min	7.05	15.51	0.28
	obs	44	44	44
pry	mean	7.44	14.26	0.23
	sd	0.09	0.34	0.09
	max	7.67	14.82	0.44
	min	7.31	13.71	0.16
	obs	36	44	36
ury	mean	8.38	14.64	0.65
	sd	0.19	0.15	0.15
	max	8.59	14.85	0.94
	min	7.92	14.37	0.46
	obs	44	44	44

Pasive countries1		ly	lppl	pos
cub	mean	7.50	15.61	0.27
	sd	0.23	0.27	0.06
	max	7.79	16.05	0.43
	min	6.88	15.18	0.18
	obs	44	44	44
dom	mean	7.22	14.75	0.15
	sd	0.18	0.43	0.02
	max	7.63	15.45	0.20
	min	6.93	14.08	0.13
	obs	25	44	25
ecu	mean	7.64	15.09	0.27
	sd	0.27	0.37	0.03
	max	8.13	15.72	0.36
	min	7.17	14.51	0.21
	obs	36	44	36
gtm	mean	7.71	14.98	0.34
	sd	0.21	0.38	0.13
	max	8.10	15.61	0.66
	min	7.21	14.41	0.22
	obs	44	44	44
hnd	mean	7.20	14.30	0.20
	sd	0.14	0.36	0.07
	max	7.40	14.92	0.42
	min	6.91	13.79	0.14
	obs	44	44	44
hti	mean	6.91	15.03	0.12
	sd	0.07	0.22	0.03
	max	7.01	15.44	0.20
	min	6.76	14.71	0.08
	obs	30	44	30
pan	mean	7.87	13.76	0.30
	sd	0.28	0.34	0.06
	max	8.35	14.33	0.41
	min	7.52	13.17	0.23
	obs	30	44	30
pri	mean	8.28	14.60	0.44
	sd	0.40	0.17	0.14
	max	8.90	14.89	0.69
	min	7.67	14.28	0.29
	obs	25	44	25
slv	mean	7.31	14.62	0.22
	sd	0.32	0.34	0.03
	max	7.80	15.24	0.30
	min	6.71	14.19	0.17
	obs	44	44	44
ven	mean	8.79	15.58	0.96
	sd	0.47	0.43	0.08
	max	9.28	16.32	1.00
	min	7.87	15.02	0.74
	obs	44	44	44

Table 6. Clubs in phase 2. ly is the logarithm of GDP per capita, lppl is the logarithm of population and pos is the position of country with respect to the richest country.

Low Reformers					High Reformers				
countries1		ly	lppl	pos	countries1		ly	lppl	pos
bra	mean	8.55	18.82	0.38	arg	mean	8.98	17.30	0.59
	sd	0.09	0.17	0.03		sd	0.11	0.13	0.08
	max	8.76	19.06	0.43		max	9.27	17.49	0.78
	min	8.34	18.50	0.30		min	8.77	17.07	0.47
	obs	33	33	33		obs	33	33	33
col	mean	8.48	17.32	0.35	bol	mean	7.80	15.73	0.18
	sd	0.15	0.19	0.04		sd	0.09	0.21	0.03
	max	8.79	17.61	0.44		max	7.96	16.07	0.24
	min	8.19	16.99	0.31		min	7.64	15.38	0.14
	obs	33	33	33		obs	33	33	33
cri	mean	8.55	14.95	0.38	chl	mean	8.88	16.41	0.54
	sd	0.15	0.24	0.04		sd	0.34	0.15	0.13
	max	8.89	15.31	0.46		max	9.48	16.63	0.73
	min	8.35	14.53	0.31		min	8.37	16.16	0.37
	obs	33	33	33		obs	33	33	33
cub	mean	7.84	16.17	0.20	pan	mean	8.59	14.71	0.39
	sd	0.15	0.06	0.03		sd	0.17	0.20	0.03
	max	8.02	16.23	0.24		max	9.01	15.02	0.45
	min	7.52	16.06	0.15		min	8.32	14.36	0.31
	obs	30	33	30		obs	33	33	33
dom	mean	7.93	15.82	0.21	pri	mean	9.21	15.08	0.79
	sd	0.22	0.19	0.03		sd	0.24	0.08	0.16
	max	8.40	16.10	0.27		max	9.66	15.19	1.00
	min	7.66	15.48	0.17		min	8.85	14.91	0.61
	obs	33	33	33		obs	27	33	27
ecu	mean	8.32	16.13	0.30	pry	mean	8.03	15.27	0.23
	sd	0.08	0.20	0.03		sd	0.10	0.24	0.03
	max	8.50	16.41	0.35		max	8.16	15.63	0.28
	min	8.15	15.75	0.23		min	7.71	14.85	0.15
	obs	33	33	33		obs	33	33	33
gtm	mean	8.11	16.02	0.25	ury	mean	8.83	14.95	0.50
	sd	0.07	0.23	0.04		sd	0.15	0.05	0.06
	max	8.22	16.41	0.32		max	9.14	15.02	0.62
	min	7.98	15.64	0.18		min	8.60	14.86	0.40
	obs	33	33	33		obs	33	33	33
hnd	mean	7.54	15.41	0.14					
	sd	0.05	0.26	0.02					
	max	7.62	15.79	0.17					
	min	7.36	14.95	0.10					
	obs	33	33	33					
mex	mean	8.75	18.23	0.47					
	sd	0.10	0.18	0.04					
	max	8.94	18.47	0.55					
	min	8.55	17.89	0.36					
	obs	33	33	33					
nic	mean	7.46	15.24	0.14	slv	mean	7.80	15.49	0.18
	sd	0.28	0.21	0.06		sd	0.12	0.11	0.03
	max	8.12	15.54	0.30		max	7.99	15.62	0.24
	min	7.18	14.84	0.07		min	7.64	15.26	0.14
	obs	33	33	33		obs	33	33	33
per	mean	8.22	16.89	0.28	ven	mean	9.11	16.80	0.68
	sd	0.13	0.19	0.05		sd	0.11	0.23	0.16
	max	8.49	17.17	0.40		max	9.33	17.13	1.00
	min	7.96	16.53	0.21		min	8.85	16.36	0.43
	obs	33	33	33		obs	33	33	33

Table 6. Clubs in phase 3. ly is the logarithm of GDP per capita, lppl is the logarithm of population and pos is the position of country with respect to the richest country.

Subperiods	
1	7
t_0: 1900	t_0: 1959
t_1: 1919	t_1: 1965
τ: 20	τ: 7
2	8
t_0: 1920	t_0: 1966
t_1: 1930	t_1: 1974
τ: 11	τ: 9
3	9
t_0: 1931	t_0: 1975
t_1: 1937	t_1: 1981
τ: 7	τ: 7
4	10
t_0: 1938	t_0: 1982
t_1: 1944	t_1: 1988
τ: 7	τ: 7
5	11
t_0: 1945	t_0: 1989
t_1: 1951	t_1: 1996
τ: 7	τ: 8
6	12
t_0: 1952	t_0: 1997
t_1: 1958	t_1: 2007
τ: 7	τ: 11

Table 7. Description of subperiods of panel data. First line is the initial year, second line is the ending year, and the last line is $\boldsymbol{\tau}$.

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