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Growth and regional disparities in the Southern Cone, 1890-1960[1]

Marc Badia-Miró*
Esteban Nicolini♠
Henry Willebald♣

Abstract

The aim of this paper is to analyze the evolution of regional income disparities in the South American Southern Cone (SASC) in historical perspective. One of the first results of our analysis is that most of the regional inequality in this geographic area stems from differences within countries rather than from disparities across countries. The second result is that the evolution of regional inequality between the end of the 19th century and the second third of the 20th century is different in each country: while Chile shows a higher inequality and a U-shaped evolution (reduction of inequality and a slight increase in the 1960), Uruguay presents a monotonically declining inequality and Argentina exhibits a U-shaped evolution with decreasing disparities until the beginning of the 20th century and increasing inequality afterwards. When the entire subnational units are analyzed together, we find a U-shaped curve which started at the end of the 19th century with high levels of inequality, a minimum is found in the 1940s and another local maximum ended with the collapse of the Import Substitution Industrialization (ISI) polices in the 1960s-1970s. We also analyze regional convergence in the long run for the Southern Cone at both national and regional level. The existence of convergence at a national level depends on the periods and countries: while Uruguay shows convergence in all the analyzed sub-periods, the provinces of Argentina only converge during the period of the first globalization; most of the departments of Chile converge in general but the presence of outliers induces the rejection of convergence hypothesis during the first globalization. Convergence at a regional level (including all the sub-national units from the three countries in the same analysis) is accepted for the period of the first globalization but rejected for the central decades of the 20th century. The empirical findings are interpreted as the result of the combination of the varying potential of the sub-national units for taking advantage of (i) the forces of agglomeration (inducing high growth rates in the main cities and, in particular, in the administrative capitals), (ii) the abundance of natural resources, and (iii) the stimulus originated in technological change, integration (or dis-integration) to international markets and public policies for industrialization.

Key words: Latin America, regional convergence, regional inequality, Southern Cone.

JEL code: N16, N56, N96, R12.

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Crecimiento y disparidades regionales en el Cono Sur, 1890-1960

Marc Badia-Miró
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Resumen

El objetivo de este artículo es analizar la evolución de la disparidad regional de ingresos en el Cono Sur Sudamericano en perspectiva histórica. Un primer resultado del análisis es que la mayor parte de la desigualdad respondió a diferencias de ingreso dentro de los países antes que a disparidades entre éstos. Un segundo resultado es que la evolución de la desigualdad regional difirió entre economías. Chile mostró una mayor desigualdad y una evolución con forma de U (reducción de la inequidad regional con un moderado aumento en los 1960s); Uruguay presentó un descenso sostenido; Argentina evidenció una evolución con forma de U, con un descenso de las disparidades hasta comienzos del siglo XX y un incremento de la desigualdad desde entonces. Cuando se analiza el conjunto de las unidades sub-regionales, se encuentra una evolución con forma de U que comienza a finales del siglo XIX con altos niveles de inequidad, alcanzando un mínimo en los 1940s para ascender desde entonces hasta hacer un máximo con el colapso del proceso de industrialización sustitutiva en los 1960s-1970s. En tercer lugar, también se analizan procesos de convergencia regional. Uruguay presenta convergencia en todos los períodos analizados; las provincias argentinas sólo convergen durante la Primera Globalización; y la mayoría de los departamentos chilenos convergen, aunque la presencia de *outliers* induce a rechazar la hipótesis de convergencia en general durante la Primera Globalización. Considerando todas las unidades sub-regionales en el análisis, se constata convergencia durante la Primera Globalización pero se rechaza para las décadas centrales del siglo XX. La evidencia empírica es interpretada como el resultado de la combinación del variado potencial de las regiones de tomar ventaja de: (i) las fuerzas de aglomeración (las cuales indujeron altas tasas de crecimiento en las principales ciudades y, particularmente, las capitales administrativas); (ii) la abundancia de recursos naturales; (iii) el estímulo originado en el cambio técnico, la integración (o desintegración) con los mercados internacionales y las políticas públicas de industrialización.

Palabras clave: América Latina, convergencia regional, desigualdad regional, Cono Sur.

Código JEL: N16, N56, N96, R12.

1. Introduction

The processes of economic development and economic growth of Latin America show very different patterns across countries and periods. Argentina, for instance, experienced very rapid growth until the WWI pushed by the export-led model, and a relative decline afterwards, while economic growth in Brazil and Mexico was faster in the second half of the 20th century, in both cases pushed by state-led industrialization policies (Bértola & Ocampo, 2012; Bulmer-Thomas, 1994). Several country studies focused on the relation between the growth of national GDP per capita and regional growth of subnational units, which in general emphasize the importance of the interaction between the localization of natural resources, trade policies, agglomeration forces and economic intervention in shaping the regional income inequality of Latin American countries in the 19th and 20th centuries.

Our contribution in this paper is based on a newly assembled dataset which includes estimates of regional per-capita GDP for Argentina, Chile and Uruguay from mid-19th century to mid-20th century. In particular, our dataset is based on recent regional GDP estimates for the Argentine and Chilean provinces, and Uruguayan departments. With this data set, we can explore the evolution of inequality and the dynamics of regional growth, considering for the first time, a set of Latin American countries at both, the national and the subnational levels, complemented with the international dimension.

Regarding the evolution of regional income disparities, our background hypothesis is the almost classical one advanced by Williamson (1965), which suggests that during the process of economic development, differences in regional incomes exhibited an evolution according to an inverted U-shaped pattern. This is the result of an increasing inequality in the early stages of the industrialization process and decreasing (i.e. convergence, which means that the poorest regions grew faster than the richest ones) afterwards, due to the fast growth observed in the lagged regions in the long-run. Our results show that the South American Southern Cone (SASC) countries do not conform this hypothesis. When the entire subnational units are analyzed together, we find a U-shaped curve with very high inequality at the end of the 19th century, a minimum in the 1940s and another local maximum with the collapse of the Import Substitution Industrialization (ISI) polices in the 1960s and the early 1970s. Our results also show that the evolution of regional inequality is different in each country: while Chile shows a higher inequality and a U-shaped evolution (reduction of inequality and a slight increase in the 1960s), Uruguay presents a monotonically declining regional inequality and Argentina, as Chile, exhibits a U-shaped evolution with decreasing disparities until the beginning of the 20th century and increasing inequality afterwards. Our interpretation of this evidence is that the process was dominated by a slow –and sometimes truncated– structural change and a sustained prevalence of the location of natural resources in the domestic production and exports, which explain a decreasing regional inequality with short periods of spatial concentration (mostly around the administrative capitals leaded by the service sector). This evolution was mediated by the successive waves of technological change (specially the changes in the demand of industrial inputs), the integration of international markets and globalization (expressed in the reduction of the transport costs and price convergence), trade policies, the mining cycles, and important institutional changes (those institutional arrangements related to the property of natural resources).

Regarding convergence, its presence at national level depends on the periods and countries: while Uruguay shows convergence in all the analyzed sub-periods, the provinces of Argentina only converge during the period of the First Globalization; the provinces of Chile converge in general but the presence of outliers induces the rejection of the convergence hypothesis during this last period. Convergence at a regional level (including all the sub-national units from the three countries in the same analysis) is accepted for the period of the First Globalization and rejected afterwards, i.e. the poorest regions diverge to the richest ones during the central decades of the 20th century while in the period of the First Globalization the poorest regions catch up the richest ones.

We suggest that this second set of empirical findings is the result of the combination of the potential of the sub-national units for taking advantage of agglomeration forces (inducing high growth rates in the main cities and in the administrative capitals leaded by industry and service sectors). In parallel, other factors also played an important role. On the one hand, the impact of the abundance and localization and the "lottery" of natural resources constituted important determinant. On the other hand, the push originated by the adoption of technological change, the integration (or dis-integration) to the international and domestic market or the existence of public policies towards the industrialization contributed with the regional disparity evolution. After this Introduction, Section 2 describes the data, the sources and the methodology considered to build the newly database. Section 3 describes the main results and, finally, Section 4 concludes.

2. Data

To avoid the lack of data to obtain regional GDP figures for Argentina, Chile and Uruguay we have considered different strategies and combine a set of methodologies. An important problem was the existence of different benchmarks for the censuses for each country (our main source). Another important problem, observed in all the countries, is the lack of direct estimations of regional production. To solve these limitations, we have considered different methodologies following the recent literature. In general terms, the method lies in obtaining distribution keys to disaggregate national sector GDPs into the territorial division (usually administrative and political divisions). The distribution keys may consist in different proxies of labor or land productivity, production, population and factors of production.

The original data from Argentina comes from four main previous contributions to obtain figures for 1895, 1914, 1946, 1953 and 1960 (Aráoz & Nicolini, 2016, 2015; Elías, 1996; Talassino, 2015). The estimation for 1895 is based on a modified version of the Geary & Stark (2002)'s methodology in which the total GDP of each sector is distributed among the twenty-four provinces based on the share of each province in an economic variable that proxies the total value added of the sector. For instance, the national aggregate value added in livestock production is distributed according to the share of each province in the total national value of cattle,

$$Y_i^{LP} = Y_{ARG}^{LP} \frac{GV_i^{LP}}{GV_{ARG}^{LP}} \quad (1)$$

Where Y_i^{LP} is the value added in livestock production in province i, Y_{ARG}^{LP} is the value added in Argentina of livestock production, GV_i^{LP} is the gross value of livestock in province i and GV_{ARG}^{LP} is the gross value of livestock in the whole country (Aráoz & Nicolini, 2016). The main sources are the national GDP (Cortés-Conde 1994) and the Segundo Censo Nacional de la República Argentina, collected on May 10th of 1895 (Bunge, 1917; Araoz & Nicolini, 2015).

The estimation for 1914 is based on the identity between the GDP and the sum of the retributions to productive factors (labor, land and capital). The main source in this approach is the Tercer Censo Nacional de la República Argentina, collected on 1914, from which stocks of land, capital and quantity of workers are available; the book "Riqueza y renta de la Argentina. Su distribución y su capacidad contributiva", by Alejandro Bunge, provides information to approximate the rates of returns of the productive factors and several reports and publications by the Bulletin of the National Department of Labor are the main source for wages.[1]

The estimation for 1946 is based on a modified Geary-Stark methodology and is obtained by distributing the sectoral national GDP –taken from Secretaría de Asuntos Económicos del Banco Central de la República Argentina and CEPAL(1958)– among provinces taking a variable that proxies the sectoral productivity in each province (with criteria similar to the estimation for 1895).

The estimation of provincial GDPs for 1953 and 1960, calculated by the Consejo Federal de Inversiones, collected and published by Elías (1996), are based on two complementary methodologies: (i) direct estimation relying on provincial data and (ii) distribution of national totals for some sectors using "adequate" weights (CFI-Di Tella, 1962) . Elías provides yearly data on provincial population for every year since 1930; we use this data for population in years 1930, 1940, 1950 and 1960. For the benchmarks before 1930, population figures come from the interpolation of Maddison's data.

Regional GDP figures of Chile come from Badia-Miró (2008, 2015). He has combined several strategies to distribute the sectoral GDP among the different provinces. National data comes from Díaz et al. (2016), correcting the industrial figures with new estimations provided by Ducoing & Badia-Miró (2013). For the value added in the agrarian and in the industrial sector, he followed the Geary-Stark methodology. The integration of the labor market in the agricultural sector was low and agricultural wages could not be a good proxy to obtain productivity differences among provinces. To solve this, he considered the economically active population to the gross production of the most representative products and land productivity as a proxy to regional disparities of productivity. For the industry, he used wages with the same objective.

For the mining sector, he proposed a direct approach considering total provincial exportations due to the enormous predominance of this sector over total exports. In parallel, he should include mining production destined for domestic consumption. For the other sectors (public sector and services), he approximated the regional value added by a set of representative variables. The part of the GDP corresponding to the remaining

[1] Araóz & Nicolini (2015) estimate the provincial GDPs in 1914 with the Geary- Stark methodology and showed that the results are very similar to the ones obtained with the identity between GDP and the retributions to the factors of production.

items was assigned considering the provincial percentage for the urban population of the entire country.

The original data from Uruguay comes from Castro & Willebald (2016) for 1870, 1884, 1890 and 1900 and Martínez-Galarraga et al. (2016) for 1908, 1936, 1955 and 1961. The estimations of Uruguayan regional GDP is based on Geary-Stark methodology, the use of other criteria that distributes the total value-added (VA) –in the case of some specific sectors– and direct estimates for some sectors where data are available.

The estimations for 1870, 1884, 1890 and 1900 follow the same methodology. We consider eight economic activities –agriculture (livestock and crops), manufacturing industry, construction, commerce, public administration, utilities and services– and we use as sectoral GDP derived from Bonino-Gayoso et al. (2012) and updated estimations of the authors.

We distribute the total sector VA of livestock according to the stock of cattle (expressed in equivalent unities to make uniform the different animal species) and, in the case of crops, according to the cereals and grapes productions. For construction, our reference was the total built surface and, for public administration, we consider income taxation of provincial governments. VA corresponding to utilities only takes into account energy generation. Finally, the distribution of manufacturing, commerce and services considers as reference a tax production ("*patente de giro*").

The estimations for 1908, 1936, 1955 and 1961 count with more available information and this extend the methodological options. We consider eight economic activities: agriculture (livestock and crops), mining, manufacturing industry, construction, public administration, utilities and services.

In agriculture, we applied a modified version of Geary-Stark methodology for the years 1908, 1936 and 1955 according to estimates of land productivity corresponding to six livestock activities and ten crop productions (Agriculture census). Data for 1961 come from available estimates by a state organism (BROU, 1965).

In mining, we count with data of economically active population (EAP) in 1908 and 1963 (Population Census) and obtain the intermediate years by (log) interpolation. In 1908, we count with information about wages and, in the other years, we applied the same wage-gap that evidenced respect to the manufacturing industry.

To carry out the estimation of regional industrial (manufacturing and construction) VA in 1908, we count with labor and wage information from Population and Industrial and Commercial Census of that year. The Industrial Census of 1936 informs about industrial VA by province. The Dirección de Industrias del Ministerio de Industria y Trabajo (DI-MIT) reports the industrial gross value output (GV) by province for 1954-1960 and we adjust these values to obtain an estimation of VA according to the relation between both concepts in 1960. As before, we consider data of 1961 according to available information.

As public utilities, we consider electricity, gas, water, and sewage. EAP by province are available for 1908 and 1963 and we estimate the province structure of 1936 and 1955 by interpolation. We assume the same income gap among provinces that we obtain for industry, considering relative wages for 1936 and relative VA per capita for 1955.

Government budgets inform about the number of civil servants in departments and we get the provincial structure, by benchmark, from this source and the total of civil servants from Azar et al. (2009). Government budgets inform also about total paid wages so we obtain wage rate (annual) which permit to identify Montevideo and the other provinces for some years. We use these gaps to obtain similar rates in 1955 and 1961.

We proceed to estimate the provincial structure of the EAP of the remaining services interpolating the figures corresponding to 1908 and 1963 and absolute values of active population of services is obtained deducting from total EAP (Fleitas & Román, 2010) the previous estimates. An extended strategy of Geary-Stark methodology has been to calculate the service sector wages as a weighted average of the agriculture and industry series in each province. However, this strategy does not seem suitable for Uruguay. The comparison between service and industrial wages in 1908 showed a gap of 10 per cent in favor of the former. The same comparison between the minimum wages per occupation (tripartite Wages Councils) in the 1940s and 1950s showed a gap of 7 per cent. Therefore, we use this last rate to determine the wages of the other services over the industrial wages.

With this original dataset, we face a first restriction related to the important size differences between the Argentine and Chilean provinces and the Uruguayan departments. To obtain more comparable regions, we have re-sized the Chilean provinces and the Uruguayan departments merging the original regions. In the case of Chile, we have grouped provinces considering the later regional division established in the 1970s.[2] For the Uruguayan case, we have considered three big regions: Littoral (Artigas, Paysandú, Río Negro, Salto and Soriano), South (Canelones, Colonia, Flores, Florida, Lavalleja, Maldonado, Montevideo, Rocha and San José) and North region (Cerro Largo, Durazno, Rivera, Tacuarembó and Treinta y Tres). Nevertheless, this re-size in the Chilean and Uruguay cases do not alter significantly the regional characterization. Particularly, those low densities regions (and high GDP pc) in the south and the north of Chile remained with the same features and the results of the analyses are not altered. In the same way, the main central economic regions, highly diversified and with an important service sector, remained with the same characteristics.

In addition, to homogenize the data of the three countries, we have considered some benchmarks: 1890, 1900, 1910, 1920, 1940, 1950 and 1960. To do that we have interpolated the shares from each national benchmark and we have re-scaled considering GDP figures from Maddison, in 1990 International Geary-Khamis US dollars.

Our methodological choices mean important data limitations and some important shortcuts. First, the above mentioned large size differences of the regions of our sample. We have proposed merging departments in Chile and Uruguay to moderate these discrepancies but, economically, the Argentine market is huge and, probably, the market of products and factors functioned differently. In particular, that Argentina had been more benefited and had taken advantage of scale economies seems more probable than in the cases of Chile and Uruguay. Second, when we propose exercises that consider the three countries as they conformed an integrated region, evidently that we are contrasting

[2] Norte Grande (Tarapaca and Antofagasta), Norte Chico (Atacama and Coquimbo), Región Central (Aconcagua, Valparaíso, O'Higgins, Colchagua, Curicó, Talca, Maule and Linares); Región Metropolitana (Santiago); Sur (Ñuble, Concepción, Arauco, Bío-Bío, Malleco, Cautín and Valdivia); Los Lagos (Llanquihue and Chiloé); Aysén and Magallanes.

data derived from different methodology strategies. We strongly believe that this point would not invalidate our results because the methodology is standard and accepted in international comparisons (see, for instance, Rosés & Wolf, 2018, for the European case). Third, we consider 1990 International Geary-Khamis U.S. dollars to compare regional GDP for the three countries, without considering differences in internal relative prices and that price differences among countries remained stable in the long run. This constitutes an oversimplification because previous evidence shows, at least, important differences within Argentina (Correa & Nicolini, 2014). An additional issue referred to this point is that the constant prices of 1990 exclude the consideration of differing evolution of relative prices between economies and the probably alterations in the real exchange rate.[3]

3. Regional inequality in the SASC: a long run approach

On the one hand, some areas of the countries of the SASC –particularly in Argentina and Chile– were "frontier economies". In these areas, land and natural resources abundance together with low population density generate very high incomes in the "frontiers" in the period of the first globalization, not comparable with the rich districts of the industrialized countries. In the SASC countries, the ratio between the income of the richest and the poorest regions was very high (Argentina 5, Chile 8, Uruguay 2.3) meanwhile in Europe these ratios were in general quite smaller (England: 1.3-1.6, Sweden: 1.2-2.2, Belgium: 1.2-1.4, Portugal: 1.6-1.9, Spain: 1.8-2.1, France: 3). The rather modest ratio between average incomes in Uruguay is probably explained by the fact that this country has not clearly distinguishable frontier areas in the period (Willebald & Juambeltz, 2017). On the other hand, many of the richest regions in Argentina and Chile specialized in livestock production or mining in very low-density regions and this fact implied very high incomes per capita.

The data set presented in the previous section opens the possibility to observe in detail the spatial evolution of economic activity in the long run. The evolution of inequality across regions can be analyzed in the context of the Williamson hypothesis which proposes that during the economic development process, disparities in the regional income exhibited an evolution according to an inverted U-shaped pattern, with increasing inequality in the early stages and decreasing (i.e. convergence) afterwards. We first obtain mean log deviation (MLD) index to observe dispersion and, later, we decompose the inequality in two components –between and within indexes– to better understand the drivers of this evolution. The within component will incorporate inequality at the interior of each country (without considering average income differences across economies) while the across component can be described as a weighted measure of inequality across average national incomes (without considering the inequality within each country). We define the MLD as:

$$MLD = \frac{1}{N}\sum_{i=1}^{n}\left(\frac{\mu}{x_i}\right) \qquad (2)$$

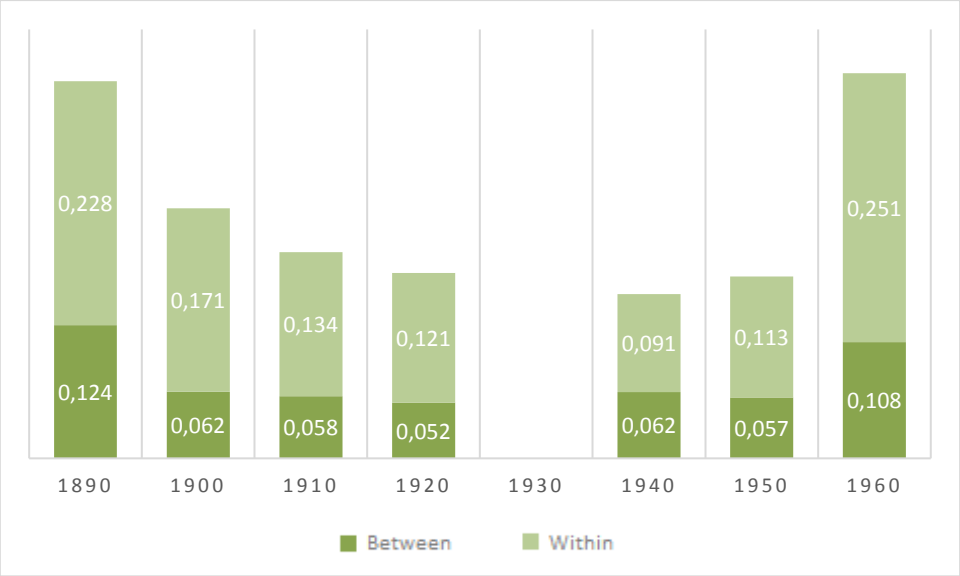
[3] For instance, as Uruguay maintained the gold standard monetary system from 1876 to 1914, Argentina repeatedly abandoned the fixed parity.

Where i is the region, n is the total number of regions, x_i is the GDP pc for each region and μ is the GDP pc of the whole unit of analysis.[4] From eq. (2), we decompose MLD as:

$$MLD = MLD_{Within} + MLD_{Between} = \sum_{j=1,2} \frac{n^j}{N} MLD^j + \sum_{j=1,2} \frac{n^j}{N} \ln\left(\frac{\mu}{\mu^j}\right) \qquad (3)$$

Where N is the total number of regions, $j=1,2,3,$ tells us whether a province belongs to one country or another, μ is the GDP pc for the SASC and μ^j is the GDP per capita in each country. The results could be observed in Figure 1.

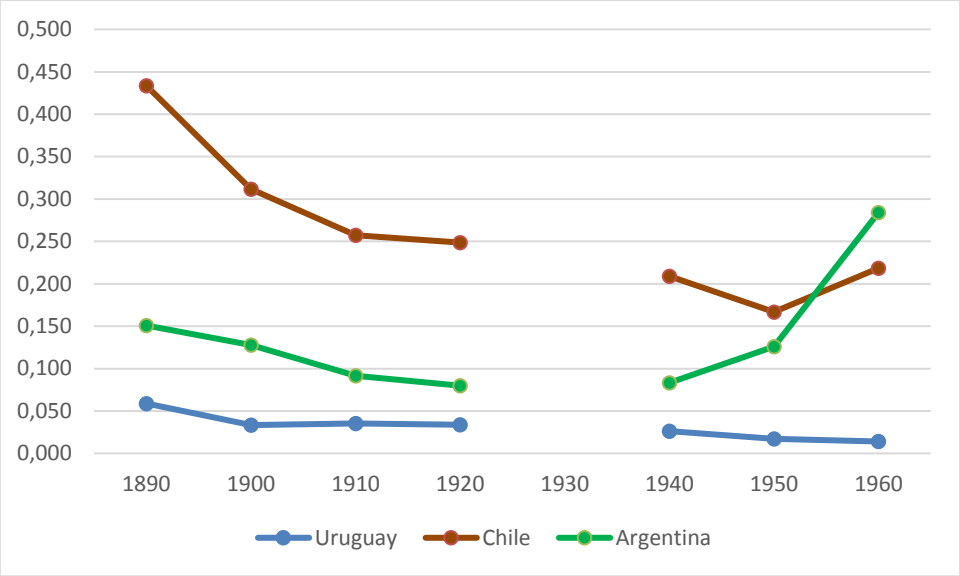
Figure 1. MLD components in Southern Cone, 1890-1960



We observe a decline in regional incomes disparity until 1940, and a strong increase between 1950 and 1960. It seems that the export led growth period, based on the intensive exploitation of natural resources, pushed a strong process of reduction of regional inequality in both components, between countries and within each country. The impact of the WWI and the Great Depression reinforced this inequality reduction, but in this case, only drove by the reduction in the within country component. During the 1940s and the 1950s, the between component is also stable while the within component started a slight increase, strongly reinforced in the 1960s. In 1960, both components increase a lot and pushed total regional inequality to similar levels to the ones observed in 1890. By country, differences were quite notable: while Chile shows a slow reduction, stopped due to the expansion of the oil cycle in the south in the 1960s, Uruguay presents a monotonically declining inequality and Argentina exhibits a U-shaped evolution with decreasing disparities until the beginning of the 20th century and increasing inequality afterwards (Figure 2).

[4] In our case, the unit of analysis is the SASC when the total inequality is being measured or each of the three countries when the national inequality is being measured.

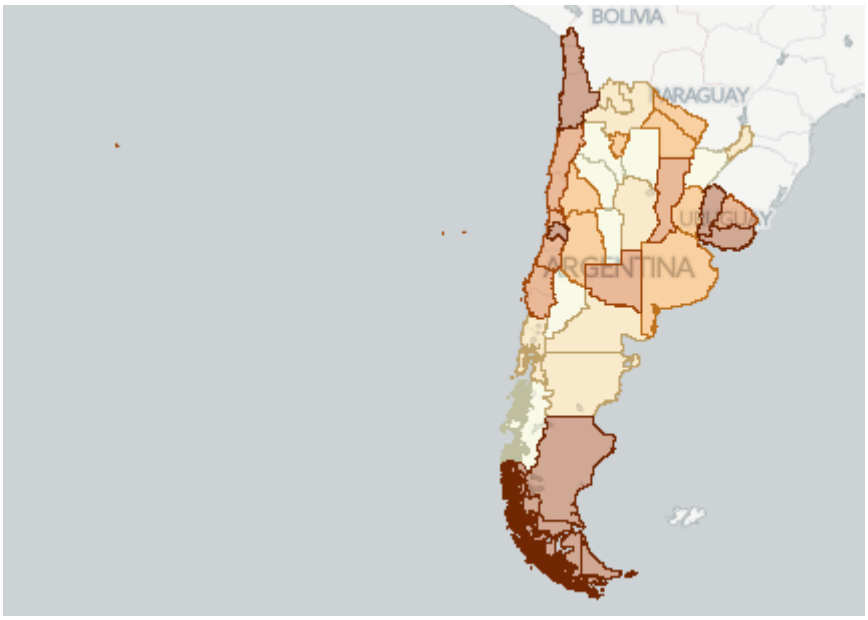
Figure 2. Regional Inequality by country, 1890-1960



The traditional analysis of inequality does not consider the geographic dimension and distances among the units of analysis. This is particularly unfortunate in the case of regional inequality because the evolution of income per capita in a region can be strongly influenced by the economic activity in the neighboring regions (through trade, migration, technological spillovers, etc.). An inspection of maps with the subnational units characterized by its average income reveals that the regions with higher average income at the beginning of our study in 1890 are in both extremes of the country and the capital in Chile, in Southern regions of Argentina and in the South and the Littoral region in Uruguay. The drivers behind that are the nitrate cycle in the north of Chile, the capital effect related to urban economies in Buenos Aires, Santiago and Montevideo, and the low density agrarian regions of the south of Argentina and Chile. The regions below the average were concentrated around the center and the north of Argentina (Map 1). [5]

[5] Darker colours represent higher incomes per capita.

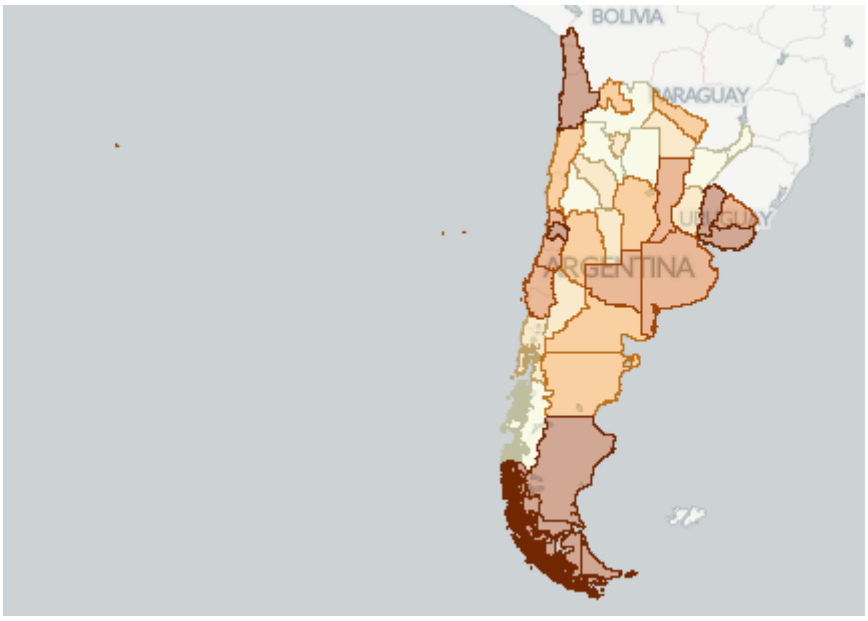
Map 1. Regional GDP pc in the Southern Cone, 1890



Source: see section 2.

Thirty years later, the cooper cycle is going to replace the nitrate cycle in Chile but the overall picture remains basically unchanged: both extremes of the country and the capital were still the richest as the southern regions of Argentina and Uruguay. Other richer regions appeared around Buenos Aires, because of a diffusion effect. The poorest regions had experienced some changes: some of them converged to the average of the region but others remained poor, specifically those in the North of Argentina (Map 2).

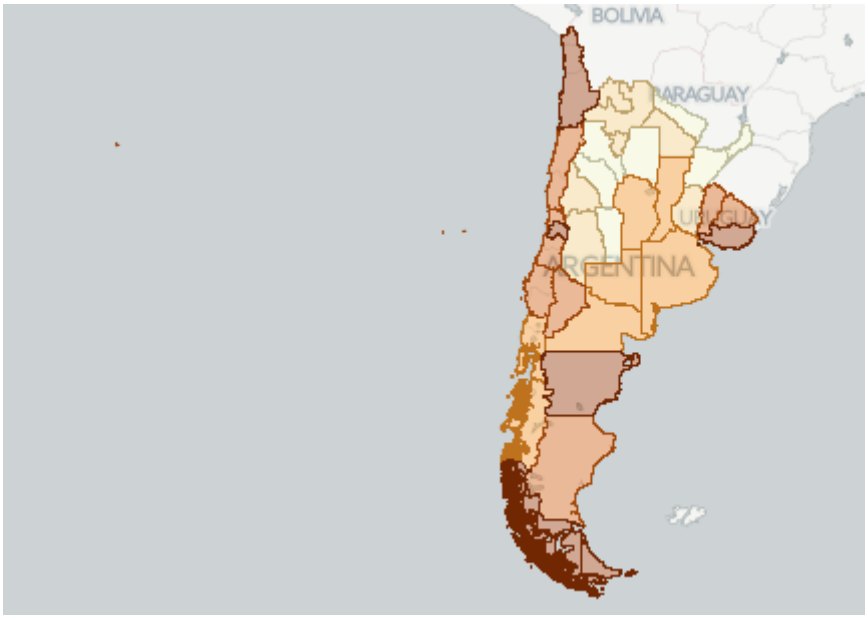
Map 2. Regional GDP pc in the Southern Cone, 1920



Source: see section 2.

The Great Depression and the ISI process changed the 1960s map in the Argentinean case while the pattern in Chile and Uruguay remained quite similar. The cooper cycle in Chile pushed the northern and the central regions and in, Argentina, a sort of a division between coastal and north-inner regions was reinforced.

Map 3. Regional GDP pc in the Southern Cone, 1960



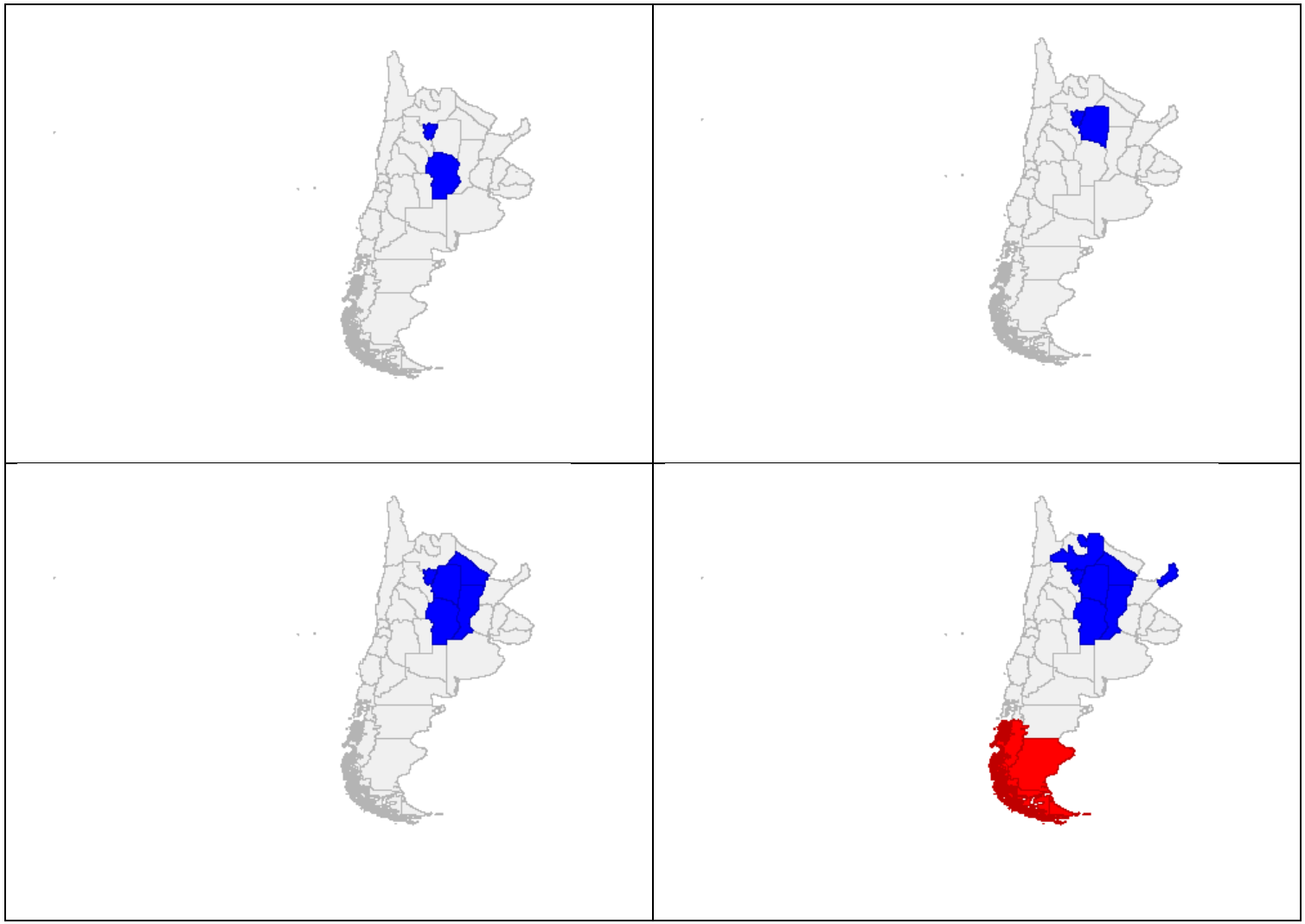
Source: see section 2

To check statistically the appearance of this cluster of rich regions in the south and a cluster of poor regions in the north we run a simple test to obtain Local Moran's I coefficient for all the regions. With this test, we can check the existence of a statistical relationship among the regional GDP pc for any region and the level of GDP pc in the neighboring regions (Figure 3).[6] Specifically, we are interested in the spatial dimension of this coefficient, in order to identify the existence of rich or poor region clusters inside the three countries or along the borders.[7]

[6] Year benchmarks: 1890, 1920, 1940, 1960. Blue: high spatial correlation between poor regions. Red: high spatial correlation between rich regions.

[7] We consider distance matrix where the cells are one if two regions are contiguous and zero in other cases (Anselin, 2010).

Figure 3. Local Moran's Spatial Autocorrelation Indexes for Southern Cone, 1890-1960



The spatial autocorrelation confirms the existence of two clusters of regions in the Southern Cone. A cluster of richer regions in the south was already observed, at both sides of the border. This cluster appeared very late towards 1960, although we could notice the existence of rich regions in the south of both countries at the end of the 19th century. The other cluster, statistically significant, is a cluster of poor regions in the inner north of Argentina, which is increasingly reinforcing and expanding towards more neighboring regions.

Another important point is that the dynamic of Chile –apart from this cluster in the south– does not seem to be influenced by the proximity of Argentina or vice versa which would add evidence to the so discussed hypothesis about the role of the mountain chains –*Cordillera de los Andes*– in the social and economic evolution of both countries. Our evidence would confirm the vision of some authors that identify the Andes with "a barrier, almost a defense, and a protective wall" (Maíz, 2007). It may be the dynamics of Uruguay have some similarities with what happens in Entre Ríos and the province of Buenos Aires (in the sense that the regions in the eastern frontier have similar levels), and a sort of diffusion effect could be observed due to the agglomeration economies in both country capitals, Montevideo and Buenos Aires. Historically, both cities formed a common economic space, with an important trade via the River Plate, and upstream the Uruguay and Parana Rivers connecting with Brazil, Paraguay and Bolivia. The consolidation of the national states in the last third of the 19th century threatened the development of the interregional trade and promoted the competence between both cities to constitute the "exit-door" of the River Plate (Zanotti, 1992). However, our evidence would confirm that the agglomeration forces resulted stronger than the political (or administrative) divisions and they continued driving the location of the production.

In the case of Chile, the drivers, which lie behind the spatial distribution of the economic activity, were the nitrate cycle and the economic expansion of the provinces of the north and its forward and backward linkages to other regions of the country. Something similar occurred with the oil cycle in the south, although the impact was lower due to its short duration. The copper cycle performs differently due to the dispersion of the copper deposits (Cariola & Sutter, 1983; Badia-Miró, 2008, 2015; Badia-Miró & Yáñez, 2015).

The insights provided by convergence analysis are a good complement of the discussion of regional inequality. In this article, we will explore the process of un-weighted convergence (Milanovic, 2009) and, following Rodrik (2013), the empirical model is based on a simple specification in which the growth rate of per capita GDP is a function of the distance between the steady state level and initial level of per capita GDP and some other characteristics specific of each country. The econometric specification will have the following form

$$\hat{y}_{it} = \alpha + \beta \ln y_{it} + \gamma D_i + \varepsilon_{it} \qquad (4)$$

Where $\hat{y}_{it}$ is the growth rate of GDP per capita in region i in each period (identified by t), y_{it} is the level of GDP per capita at the beginning of the period in that region, and D_i is some characteristic of region i (typically in our exercise, belonging to a particular country).

When we use large regions in Uruguay and Chile, the number of sub-national units is reduced to three and eight respectively. Given that, according to Maddison, in 1920 Argentina per capita GDP is clearly higher than in Chile and Uruguay, we can evaluate the hypothesis that Argentina steady state was different in this period. Hence the national dummy will be for Argentina.[9]

The main results that we obtain in the period of 1890-1920 –corresponding to the first globalization– show strong evidence of convergence and the Argentina dummy is not significant (Table 1, column 1).

Table 1. Convergence regression of SASC regional growth (OLS)

	(1)	(2)	(3)	(4)
Region	SASC	SASC[10]	Argentina	Chile and Uruguay (without Magallanes)
Dependent variable	Growth 1890-1920	Growth 1940-1960		
lngdppc1890	-0.012			
	(5.25)**			
dum_arg	0.000	-0.007		
	(0.09)	(0.79)		
lngdppc1920		0.011	0.028	-0.021
		(1.35)	(3.34)**	(8.98)**
Constant	0.096	-0.069	-0.199	0.182
	(5.57)**	(1.02)	(3.22)**	(9.81)**
R^2	0.57	0.15	0.34	0.90
N	35	36	24	11

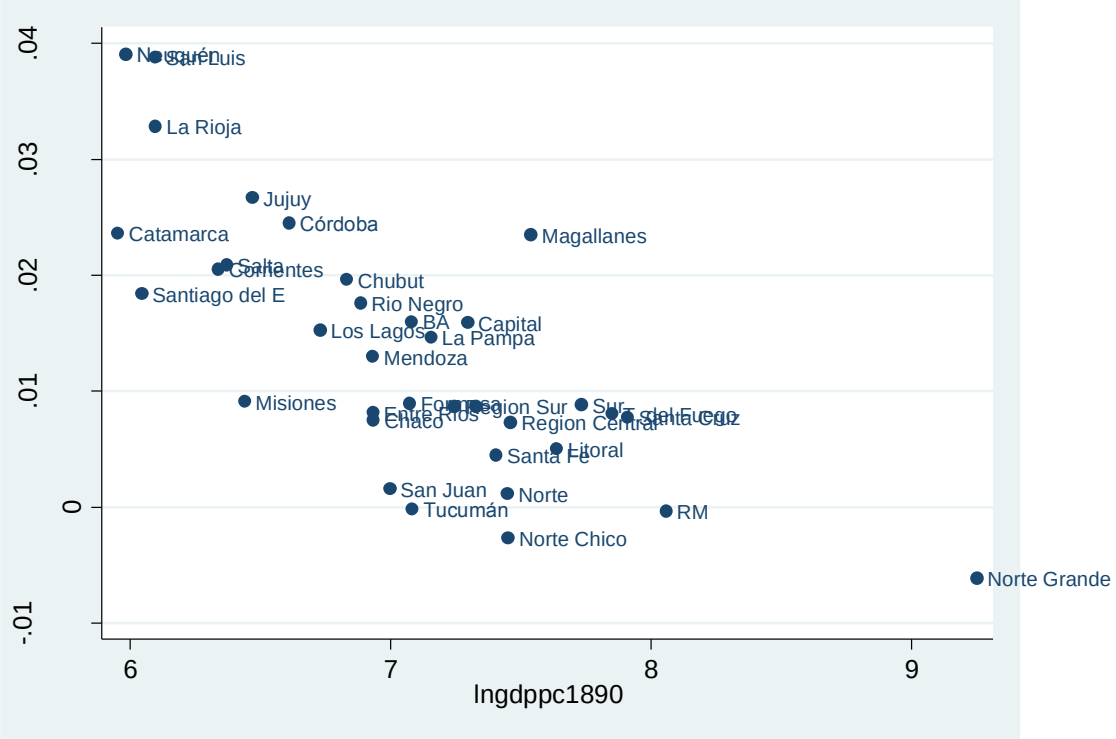
* $p<0.1$; ** $p<0.05$

Figure 4 presents the scatter plot with all the regions in the three countries and the growth rates between 1890 and 1920 in the vertical axis and the GDP in 1890 in the horizontal axis. It is consistent with the results presented in column 1 and it is clear piece of evidence of convergence with the regions of the three countries mixed in all the portions of the graph and without significant outliers.

[9] Formally the dummy variable in this case will be D=1 if the region is in Argentina and D=0 otherwise.

[10] In this specification, we have 36 observations because we have included Aysén's figure (in Chile) which is not available for 1890.

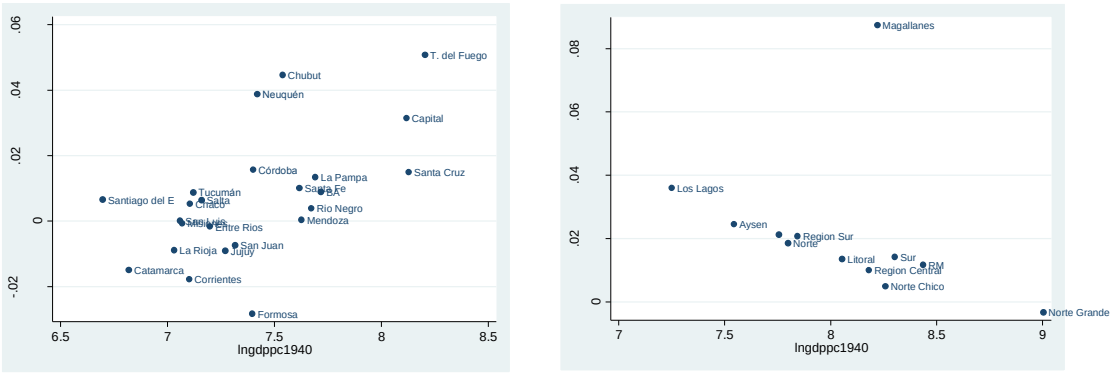
Figure 4. Growth rates between 1890 and 1920 in all the regions of the South American Southern Cone



However, in the period of the ISI (1940-1960) we do not find evidence of convergence. If we include the three countries in the sample (Column 2 of Table 1), the non-convergence hypothesis cannot be rejected even though if we incorporate the possibility of a different steady state for Argentina.

The scatter plots in Figure 5, with growth rates between 1940 and 1960 in the vertical axis and GDP per capita in 1940 in the horizontal axis, suggest that this result is driven by two situations: first, in Argentina (at the left) there is a clear process of divergence (the higher the initial level of per capita GDP in 1940, the higher the growth rates). Second, if we consider Chile and Uruguay together (at the right), the region of Magallanes is an outlier with strong influence on the results of the regression.

Figure 5. Growth rates between 1940 and 1960 and GDP in 1940 in Argentina (left panel) and Chile and Uruguay (right panel)



A formal test of the process of divergence in Argentina in the period 1940-1960 is presented in column 3 of Table 1 where the parameter of initial level of GDP in the regression is significantly positive. Similarly, taking out the outlier of Magallanes (Table 1, column 4) there is strong and highly significant convergence evidence even though we have only 11 observations in the sample.

The pattern of the evolution of inequality in the three countries is consistent with the results of the convergence analysis: Argentina and Chile have a U-shaped curve and Uruguay shows declining inequality in the two sub-periods. We could also confirm the specific pattern of Argentina, when comparing it with the other countries. The reason is that we can diagnose convergence in 1890-1907 (taking out Magallanes) for the three countries, convergence for Chile and Uruguay in the 20th century, but not-convergence for Argentina. Therefore, the ISI and the inward-looking policies would have had an egalitarian effect in Chile and Uruguay but not for Argentina. In Argentina, there is convergence in the 20th century only if Capital Federal and Tierra del Fuego are taken out of the sample; these two districts, as we will argue below, are linked to different patterns of growth. The former is based on agglomeration economies and the other is linked to low density, land abundance and policy intervention (government sector is quite important in 1946), which would confirm our hypothesis of the egalitarian forces related to industrialization process in the SASC.

This pattern is in some way confirmed by the MLD indices: while Chile and Argentina follow a U-shape consistent with the pattern of first convergence and then divergence, Uruguay has monotonically decreasing inequality (consistent with the always-convergent situation). However, we must keep in mind that the inequality increase, at the end of our period of analysis, and this has different drivers. While in Chile could be explained by the expansion of few regions, related with natural resources endowments (especially oil in Magallanes), in Argentina, the driver were the expansion of Buenos Aires and also a region with abundant natural resources (Tierra del Fuego).

The leading sectors behind those regional economies with higher growth rate differed between countries. For the Argentinean case, in our analysis of the regional divergence in the period 1920-1960, showing that the initially-rich and fast-growing provinces (in the context of persistence-divergence) were Capital Federal, specialized in secondary and

tertiary sectors affected by agglomeration economies, but also Tierra del Fuego and Santa Cruz, examples of low population density and land abundance regions. In the case of Tierra del Fuego, the expansion of the public sector explained an important share of total regional expansion. The expansion of the State strongly affected those districts with very low population in the sense that some policies of public investment, even small, can produce relevant effects in productivity and in income per capita. In the Chilean case, there is an intense concentration of the economic activity around the capital, Santiago, and a reduction of regional inequality in the long run, modified by the existence of different mining cycles (nitrate, copper and oil). It seems that natural resource endowment and the dynamics behind the capital of the country (political dimension, high market potential but small agglomeration economies) drove the evolution of the location of the economic activity in the long run. It is also important to bear in mind that the mining cycles had different impacts on spatial distribution of the economic activity, that is, for nitrates and oil, regional GDP pc disparities increase and the country became polarized. The reason behind that is the huge expansion of the demand in few regions generated strong linkages to other regions (in that sense, the oil cycle concentrated in the South, although, short, had some similarities with the nitrate cycle). On the other hand, cooper cycle, more scattered and capital intensive, had a smaller impact.

4. Conclusions

Economic growth in SASC countries, in the 19th and the 20th centuries, was not exclusively based on a process of industrial expansion but on the exploitation of natural resources in the context of a strong integration into the international markets of goods and production factors. Eventually, the region showed a complementary process of industrial growth with high state intervention after 1930.

Some resource abundance regions in Argentina and Chile (frontier economies) have very low population density and, consequently, regional inequality attained unusual high levels in those countries at the end of the 19th century. The level of regional inequality in Uruguay, a land abundant country but not frontier economy, was more in line with those of the European countries.

The peculiar pattern of growth in SASC countries had also strong implications for the time evolution of inequality. In the period 1890-1920, the last part of the process of export-led growth in the three countries, inequality was decreasing as some regions, initially strongly favored by the international demand of a rather limited set of commodities in agriculture (Argentina and Uruguay) and mining (Chile), started to experience some decreasing marginal returns. In the second period, after the Great Depression and the international recession of the 1930s, the evolution of inequality depended of the specific form in which each country adjust-strategies were adapted in a protectionist world, how they implemented ISI policies and how they dealt with the regional dimension of the exploitation of natural resources (especially related to the mining cycles).

The convergence analysis confirms this point: while convergence is clear and strong for the three countries between 1890 and 1920, after 1940 there is divergence in Argentina

and a kind of convergence in Chile and Uruguay (when low-density regions were excluded).

In the Argentine case, and partially in the Chilean case, the failure of the state-led industrialization policies to consolidate the reduction of inequality observed in the previous periods, suggest that developmentalism was less successful in the goal of ending regional disparities in these countries than in Uruguay where a process of inequality reduction and convergence is noticeable until the last decades of the 20th century.

3. Bibliography

Anselin, L. (2010). "Local Indicators of Spatial Association-LISA", *Geographical Analysis*, 27, 93–115

Aráoz, F. and Nicolini, E. (2016). "The "Persistence vs. Reversal and Agglomeration Economies vs. Natural Resources. Regional inequality in Argentina in the first half of the twentieth century", *Documentos de trabajo Universidad Carlos III*, 1505, Madrid, Spain.

Aráoz, F. and Nicolini, E. (2015). "The evolution of regional GDPs in Argentina during the period of globalization at the end of the 19th and beginning of the 20th century". Paper presented at the *LI meeting of the AAEP*, Argentina.

Azar, P., Bertino, M., Bertoni, R., Fleitas, S., Garcia Repetto, U., Sanguinetti, C. y Sienra, M. and Torrelli, M. (2009). *¿De quiénes, para quiénes y para qué?: las finanzas públicas en el Uruguay del siglo XX*. Montevideo, Uruguay: Fin de Siglo.

Badia-Miró, M. (2015). "The evolution of the location of economic activity in Chile in the long run: a paradox of extreme concentration in absence of agglomeration economies", *Estudios de Economía*, 42, 143–167.

Badia-Miró, M. (2008). *La localización de la actividad económica en Chile, 1890 - 1973. Su impacto de largo plazo*. PhD Thesis, University of Barcelona.

Badia-Miró, M. and Yáñez, C. (2015). "Localization of industry in Chile, 1895-1967: mining cycles and State Policy," *Australian Economic History Review*, 55, 256–276.

Bértola, L. and Ocampo, J.A. (2012). *The Economic Development of Latin America since Independence*. . Oxford: Oxford University Press.

Bonino, N., Román, C. y Willebald, H. (2012). "PIB y estructura productiva en Uruguay (1870-2011): Revisión de series históricas y discusión metodológica", Series *Documento de Trabajo, 05/12. Instituto de Economía*, Facultad de Ciencias Económicas y de Administración, Universidad de la República.

BROU (1965) *Cuentas Nacionales*. Departamento de Investigaciones Económicas, Banco de la República Oriental del Uruguay, Montevideo.

Bulmer-Thomas, V. (1994). *The economic history of Latin America since independence*. Oxford: Oxford University Press.

Bunge, A.E. (1917). *Riqueza y Renta de la Argentina. Su distribución y su capacidad contributiva*. Buenos Aires, Argentina.

Cariola Sutter, C. and Sunkel, O. (1983). *Un Siglo de historia económica de Chile 1830-1930: dos ensayos y una bibliografía*. Madrid: Cultura Hispánica.

Castro, P. and Willebald, H. (2016). "Desigualdad regional del ingreso en Uruguay durante la Primera Globalización: primeras estimaciones y algunas hipótesis". Paper presented in *V CLADHE, São Paulo*, July.

CEPAL (1958). *El Desarrollo Económico de la Argentina*. Santiago de Chile, Chile.: CEPAL / ECLAC. Naciones Unidas.

CFI-Di Tella (1962). *Relevamiento de la Estructura Regional de la Economía Argentina*. Buenos Aires, Argentina.: Ediciones Instituto Di Tella, 260, Argentina.

Correa, F. and Nicolini, E. (2014). "Diferencias regionales en el costo de vida en Argentina a comienzos del siglo XX", *Investigaciones de Historia Económica,* 10, 202-212.

Cortés-Conde, A. (1994). "Estimaciones del Producto Bruto Interno de Argentina, 1875-1935", *Working Paper Universidad de San Andres, Departamento de Economia*, 3, Argentina.

Díaz, J., Lüders, R. and Wagner, G. (2016). *Chile, 1810-2010. La República en Cifras. Historical Statistics*. Santiago de Chile, Chile: Ediciones Universidad Católica de Chile.

Ducoing C. and Badia-Miró, M. (2013). "El PIB industrial de Chile durante el ciclo del salitre, 1880 -1938", *Revista Uruguaya de Historia económica*, III (2013), 11–32.

Elías, V.J. (1996). "Un informe de la economía de Tucumán, sus determinantes y perspectivas". In Elías, V.J. (ed.) *Informe sobre la economía de Tucumán*. Fundación del Tucumán.

Fleitas, S. and Román, C. (2010). "Evolución de la población económicamente activa en el siglo XX: un análisis de la estructura por sexo, edad y generaciones", *Boletín de la Asociación Uruguaya de Historia Económica*, 9, 41–64.

Geary, F. and Stark, T. (2002). "Examining Ireland's Post-Famine Economic Growth Performance", *The Economic Journal*, 112 (2002), 919–935.

Maíz, C. (2007). "La cordillera de los Andes: de muro a portal. Visiones del otro a través del espacio", *Revista de Literaturas Modernas*, 37, 113-156.

Martínez-Galarraga, J., Rodríguez Miranda, A. and Willebald, H. (2016). "Regional income inequality in Uruguay in a century (1908-2008). Did public production policy contribute to an equalizing process?". Paper presented in *V CLADHE, São Paulo*, July.

Milanovic, B. (2009). "Global inequality recalculated: the effect of new 2005 PPP estimates on global inequality". *Policy Research working paper*; no. WPS 5061. Washington, DC: World Bank.

Rodrik, D. (2013). "Unconditional convergence in manufacturing", *Quarterly Journal of Economics,* 128, 165-204.

Rosés, J. and Wolf, N. (2018). *The Economic Development of Europe's Regions: A Quantitative History Since 1900*, London, Routledge (in press).

Secretaría de Asuntos Económicos (1955) *Producto e Ingreso de la República Argentina en el período 1935-1954*. Buenos Aires, Argentina. Banco Central.

Talassino, m. (2016)."Producto Bruto Geográfico de 1946 de las provincias argentinas: Una estimación preliminar". Paper presented in the *Tercer Foro Bienal Iberoamericano de Estudios del Desarrollo. Montevideo y Tacuarembó*, Uruguay.

Willebald, H. and Juambeltz, J. (2017). "Land frontier expansion in settler economies (1830-1950): Was it a Ricardian process?" In Pinilla, V. and Willebald, H. (Eds.) *Agricultural development in the world periphery: a global economic history approach*, Ch. 17, Palgrave Studies in Economic History (In press).

Williamson, J. (1965). "Regional inequality and the process of national development: a description of the patterns". *Economic Development and Cultural Change* 13 (4), 3-84.

Zanotti, L. (1992). "Un ciclo comercial en la Cuenca del Plata (1852-1920)", *Revista Complutense de Historia de América*, 18 (1992), 219-239.

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